The Wildflower Garden:

Ecological Restoration in Urban Environments

by

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ABSTRACT

Climate change, unrestricted urban sprawl, and industrial agriculture have led to catastrophic degradation of native habitats and unprecedented biodiversity loss, especially within cities. To help address this, this practicum highlights the use of native wildflower and grass species in urban environments as alternatives to traditional turf grass landscaping. Through small-scale wildflower garden design and implementation, and community engagement, approximately 120 square feet of lawn was converted to host 14 native plant species with 168 individual plants. A community-based presentation was delivered to inspire like-minded individuals into restoring parts of their own spaces with native species in hopes of creating a mosaic or habitat matrix within a local urban environment. After speaking with city planning officials and community organizations, the general consensus is that people are in favour of habitat restoration but the problem of long-term maintenance and funding remains prevalent. By working with enthusiastic homeowners, these challenges can be addressed and sustainable care and stewardship may be achieved.

ACKNOWLEDGEMENTS

I would like to extend my deepest gratitude to the following individuals and organizations for their invaluable assistance throughout the entire practicum process. Without their support, this project would not have been the success that it is today.

Firstly, I wish to thank Sharon Enns for her enthusiastic participation and assistance in selecting the location for the garden, as well as her genuine delight and continuous engagement throughout the entire process. Her involvement was instrumental in bringing this project to life.

A heartfelt thanks to Erin Cox for her unwavering support and encouragement, which provided me with the motivation and confidence to see this project through to completion.

I am immensely grateful to The Winnipeg Wildflower Project and Prairie Originals for their expert wisdom, guidance, and assistance in selecting and providing the native plant species. Their combined knowledge helped in ensuring the ecological integrity and success of the garden.

My sincere appreciation goes to the Westman Naturalists for kindly hosting the public presentation. Their cooperation and support helped in extending the project's goals and inspiration to a broader audience.

I would also like to acknowledge the invaluable contributions of Nicola Koper, Iain Davidson-Hunt, and Stephane McLachlan. Their tutelage, leadership, and eternal patience throughout this journey have been priceless. Their guidance has been a cornerstone of my learning and development throughout this practicum.

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Contents

CHAPTER 1: INTRODUCTION

After seeing endless doom and gloom reports in the news regarding environmental degradation and the devastating effects of biodiversity loss, I felt helpless. There must be something I could do to help the environment. I cannot control massive, multinational corporations, but I can help address biodiversity loss within my own community. Certain that others are feeling the same helplessness when it comes to environmental concerns, I took action to help guide, unite, and inspire others into taking action.

I initially contacted larger organizations within the city of Winnipeg, such as city planners and community groups in charge of walking pathways or other organizations with large areas with potential for restoration projects. These organizations were keen on the basis of the project. They were in favour of introducing native species and helping the environment, but the same problems of who would pay for the resources and maintain the project after the master's was complete surfaced. By reducing the size of the restoration project to something more affordable and manageable, I was able to find a homeowner willing to participate and do their part toward helping the environment.

The objective was to convert ecologically unproductive land back into something that could serve as habitat and restore native species to where they traditionally have grown. I wanted to inspire others to do the same, thinking that even a few wildflowers or grasses were better than the Kentucky bluegrass alternatives of a sterile, uninviting lawn habitat. By utilizing an aesthetically pleasing wildflower garden design, it showed the potential of what native species could do for local homeowners, but also provided season-long habitat and resources for native pollinator species.

The deliverables included a garden design that incorporated native species of varying colours, textures, and sizes, and that specifically provided pollen sources throughout the entire growing season from early spring to late fall. Working with the homeowner, I was able to acquire these plants from Prairie Originals, and all the soil amendments and resources from local businesses, to then install all of the plants in a high visibility location within the city of Brandon. The design, the garden itself, and then a public presentation of the results after planting acted as deliverables for this project and the community. Working with the Westman Naturalists, a small group of approximately 25 individuals listened to my explanation of the planting design, the purpose, and what they could do in their own spaces. Many individuals later contacted me requesting my assistance for creating similar spaces on their properties or to show me the habitats and spaces they have already fostered in their own yards.

Through guidance from The Winnipeg Wildflower project, regarding different plant species to incorporate (based on the plants' growing nature and how well they behaved), I was able to work with Sharon Enns to convert a section of her front yard into a native wildflower garden. Sharon openly admits that she does not have a green thumb and actually does not enjoy gardening, but wants to do her part to help the environment in whatever way she can. (After completing the project, Sharon has made many not-so-subtle hints to include restoration efforts in other areas of her property. For someone who does not like gardening, this certainly is a lot more gardening.)

Throughout the steps of the project, I consulted with Sharon regarding the design of the wildflower garden itself. I informed her of my intentions to include species that would provide constant flowering throughout the entire growing season, but also behave in a way that would not raise the concerns of her neighbours. Using the Prairie Originals website/catalog, I was able to

demonstrate what the plants would look like for Sharon and what to expect during their vegetative growth stages. I developed a garden tasks calendar, to help inform Sharon of the different stages of maintenance that may be required once the installation was completed, so that long-term maintenance could be provided by her. Delightfully, Sharon has contacted me regularly with any updates or questions regarding the development of the garden. This includes different insect sightings or when flowers have come into bloom. For someone who is averse to gardening, the child-like wonder and splendor of the garden have truly been infectious for Sharon.

After the garden design was created and the plant material was ordered, soil amendments and mulch also had to be obtained. In early June, all of the resources were assembled, and with the help of Sharon and her husband, the garden was planted successfully following the planting guide. The plants were watered, weeded, and maintained, and the public presentation was organized for mid-September through the Westman Naturalists environmental group. Small plant ID signage was 3D printed to assist Sharon and onlookers with plant identification for the presentation and throughout the growing season.

This completed the requirements of the project, but as time allowed, observations were taken of the garden status the following spring of 2024. Almost all plants have returned and shown vigorous growth this season, save for four individual species that may have succumbed to terminal browsing and winterkill. Given the high return rate and the positive response from Sharon and the participants of the community, this small-scale project can be considered successful as a means of altering the landscape but also inspiring others to do the same.

The key takeaways from this project include the discovery that people in general are supportive of lawn alternative planting that supports the environment and provides visually pleasing

aesthetics. When informed about the low maintenance requirements of native species (low watering, minor weeding once established, no fertilizer, minimal upkeep), people understand the positive aspects of using native species in an urban setting. But when it comes to the long-term supervision and stewardship of these kinds of projects, it can be difficult to secure financial support and volunteer guarantees. Native planting is not "set it and forget it." Thankfully, ecologically conscious individuals are willing to provide the care, time, and resources toward traditional lawn conversions; they may just need the education, support, and inspiration from others in their community. Having witnessed the joy and excitement that comes from Sharon whenever a new plant flowers or a pollinator is spotted, I know that a mosaic of wildflower gardens can be utilized within a neighbourhood to build community and provide the environmental benefits that come with ecological landscaping. Small-scale is achievable and can be combined to produce a large-scale effect. For example, American entomologist Douglas Tallamy's "Homegrown National Park" project allows individuals to register their home gardens onto a continent-wide biodiversity map of homeowners that have converted parts of their land to native habitat. Initiatives like these are at the forefront of small, personal changes and simple actions that make huge impacts across North America and beyond.

Following the introduction, this practicum document outlines details regarding the deliverables of the project, such as how they were drafted, created, implemented, and reviewed. A reflection of the entire process has also been included, as well as a photo journal documenting the different stages of installation and growth periods following. The appendices contain the Integrated Project Plan, budgeting and planning elements, and a detailed literature review regarding the ecological principles behind small-scale naturalization of urban landscapes.

CHAPTER 2: DELIVERABLES

The deliverables for this project included the wildflower garden design, the implementation of the garden itself, the public presentation to the community, and indirectly, a photo journal documenting the entire process. The design was created under the following criteria: the garden must use species native to southwestern Manitoba (specifically the Brandon area) with varying textures, blooming periods, colours, sizes, light and moisture requirements, and spreading habits. The native species chosen provide habitat and resources to native pollinators throughout their lifecycle, not just pollen during their adult stages. The colours were chosen to combine complementary colours and offer a beautiful experience as well as an ecological one (e.g., bee balm and yellow coneflower).

The garden itself is composed of two mirrored beds, approximately 60 square feet in size. Smaller, well-behaved plants make up the street-facing front of the garden. This is done intentionally to ensure light exposure to all plants throughout the day, so that the larger, leafier plants act as a backdrop and do not overshadow the gentler, more delicate species in the front. Next, species that grow well together were prioritized. I wanted plants that would not outcompete each other immediately and that would not spread aggressively into neighbouring landscapes. The goal is to encourage neighbours with wildflowers, not aggravate and create conflict with them. All of the selected species are significantly drought-tolerant as the soil conditions are particularly sandy. This is also a beneficial trait as it means less water and time resources are required to maintain these species. As the location for the garden receives ample sunlight, sun-loving species were selected, as opposed to more shade-requiring species. Once the plant growing conditions had been met, the blooming conditions were factored in. The main priority is for there to be ever-present flowers within the garden throughout the entire growing

season. This not only provides pollinators with nutrient-rich resources but also provides the homeowner with flowers to enjoy in the spring, summer, and fall.

The garden design included a bloom calendar to help the homeowner know what to expect in terms of plant emergence, but also included maintenance tasks to be completed in each of the seasons throughout the year. As the homeowner is self-admittedly not garden-oriented by nature, these steps and guides to maintaining the project were extremely beneficial. Finally, the garden design/map was used for the actual installation guide of the garden itself, and also as an informational handout for the public presentation delivered in early September.

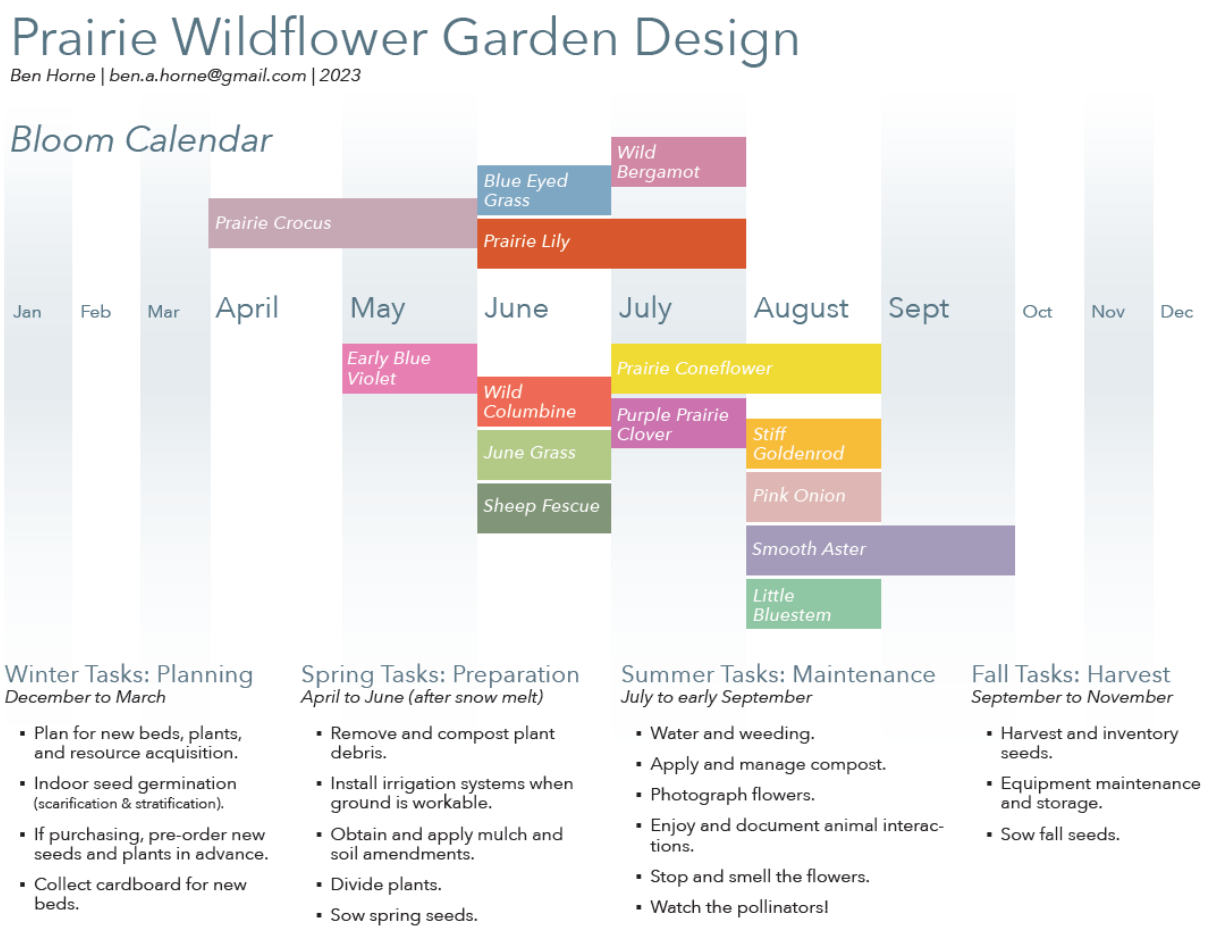

FIGURE 1: GARDEN DESIGN (BLOOM CALENDAR & TASKS)

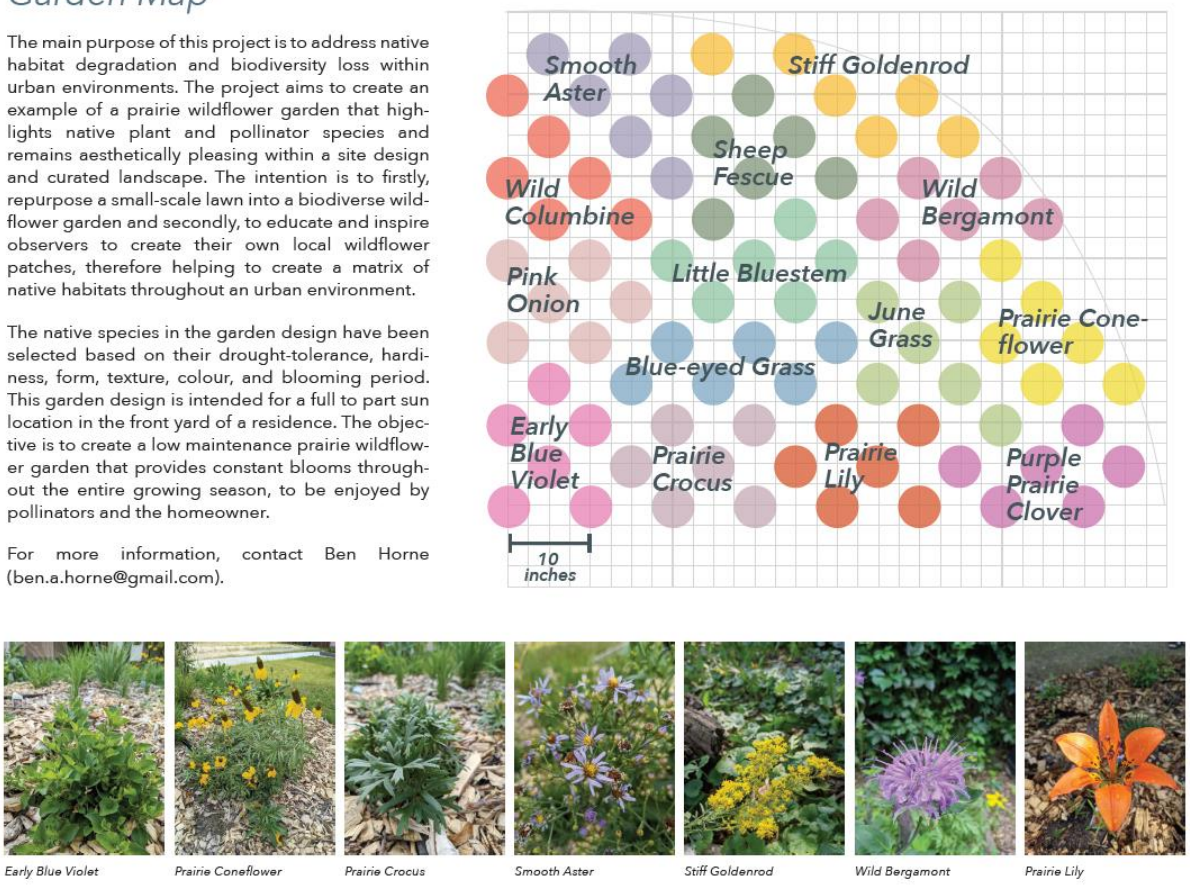

FIGURE 2: GARDEN DESIGN (GARDEN MAP)

In early June, Sharon, her husband, and I assembled the materials necessary to perform the installation of the project. Healthy, nutrient-rich topsoil from a local garden center was purchased, woodchips from the City of Brandon were acquired, and the 168 native plants were bought and delivered from the Prairie Originals nursery in Selkirk, MB. Cardboard was laid out to cover the existing turf grass vegetation, the soil amendment was placed on top, plants were planted in accordance with the grid of the design, a soaker hose was snaked throughout the plants (allowing easy water access to the root systems), and then the woodchip mulch was applied to cover all exposed soil and hosing. The mulch acts as a weed-suppressing barrier, prevents soil erosion, and is quite effective in retaining moisture within the soil, reducing the necessity for

additional watering. After a weekend of planting, sweating, and swearing, the garden was in place and plant identification signs were installed for each species.

Over the next four months, the garden received weekly weeding, watering, and general maintenance, and by mid-September, was ready for the public presentation. Thanks to the Westman Naturalists for hosting the event with their members and volunteers, I presented on the environmental challenges this project is meant to address, the process of acquiring and installing the components, and how each of the people present could implement a similar wildflower garden in their own landscapes. Not only would their small-scale efforts be beneficial to the area, but as a whole, each one would improve the biodiversity and ecological well-being of the region.

As part of the documentation of the installation of the garden, and the subsequent status updates, a photo journal has been compiled. This covers the conditions of the garden site prior to preparation, the installation process, and then monthly check-ins of vegetative development and blooms. The photos have been ordered into nine small segments. These include: before installation, plants prior to planting, installation, three weeks later, two months later, end of August, public presentation, photos provided by Sharon Enns, and finally, the most up-to-date photos of the garden in May, 2024. Each section contains a brief description detailing noteworthy components and specific species observed. All photos, unless otherwise specified, were taken by Ben Horne.

CHAPTER 3: PHOTO JOURNAL

Before Photos

FIGURE 3A

FIGURE 3B

FIGURE 3C

Before Photos

These images display the location prior to any alterations. The property is west-facing, contains two little leaf lindens and a thin scattering of Kentucky bluegrass and quack grass. The placement of the garden is not affected by the slope of the ditch area. The northern side of the yard (Figure 3C) receives more direct sunlight than the southern side, but both still have enough for the plant requirements. Soil conditions are sandy and compact, thus the need for additional soil amendment.

Plants Prior to Planting

FIGURE 4A

FIGURE 4B

FIGURE 4C

FIGURE 4D

Plants Prior to Planting

168 native plants purchased from Prairie Originals in Selkirk, Manitoba. 14 different species with one mature plant and five immature plugs each, then multiplied by two for each of the mirrored gardens. Figure 4A demonstrates the 4.5” mature plants and Figure 4C illustrates the immature plug plants. The blue-eyed grass can be observed flowering prior to planting in Figure 4D.

Installation Process

FIGURE 5A

FIGURE 5B

FIGURE 5C

FIGURE 5D

FIGURE 5E

FIGURE 5F

FIGURE 5G

FIGURE 5H

FIGURE 5I

FIGURE 5J

FIGURE 5K

FIGURE 5L

FIGURE 5M

FIGURE 5N

Installation Process

The following series of images outlines the installation process, from preparing the bed, to adding amendments, and incorporating the plants. Figure 5A displays the general shape of one of the garden sections and the beginning of turning the soil. The existing quack grass was shoveled and flipped to loosen the soil, expose the roots, and suffocate the vegetation. (Ideally, the quack grass roots would have been completely removed, but time and effort took priority.) Figure 5B reveals all of the soil has been turned and then a layer of cardboard is applied overtop as a form of "lasagna mulch". This supresses the existing vegetation and helps reduce weed growth and interference. Figure 5C shows two layers of cardboard added, then soaked with a hose to add some weight and help maintain its location. Dry cardboard tends to blow away given the opportunity and the moisture will help the cardboard decompose later. Top soil from Alternative Landscaping was applied over the entire surface area, approximately six inches deep.

Once all of the topsoil has been applied, the plants are ready to be installed. We planted the northern bed first and used a 10-inch bamboo stick as a measuring guide for placement. Typically, this method for plant spacing would work but as three individuals were planting in different locations at different times, it led to unnecessary confusion and angst. Figure 5I demonstrates the revised planting strategy (on the southern bed) that allowed for better alignment and visual accuracy. I attempted to console Sharon that the exact placement of plants was not crucial as they would grow wherever they wanted, but an orderly installation was much more comforting for the homeowner.

Figure 5K shows that application of the soaker hose, to be placed on top of the soil, close to the plants, but under the wood mulch, to allow for the most effective moisture retention. Figures 5L through 5N show the completed installation in both beds. Woodchip mulch has been added on top to prevent erosion, supress weeds, and maintain moisture levels. The mulch was acquired from the City of Brandon in a free giveaway. The entire process took 10 hours and required half an hour of running the soaker hose afterward to help root establishment.

Three Weeks Later

FIGURE 6A

FIGURE 6B

FIGURE 6C

FIGURE 6D

Three Weeks Later

Checking in on the plants three weeks later revealed positive establishment, minimal weed presence, and very minor animal browsing. Figure 6A reveals the encroaching quack grass from the yard, which was treated with additional woodchip mulch application and mowing. The woodchips proved effective in suppressing weed growth with only a few alien species observed. Unfortunately, some of the prairie lilies exhibited signs of animal browsing, which was anticipated given the ground squirrel populations witnessed in the area. As these native species have evolved to survive predation, the lilies returned the following spring with no signs of stress given their past consumption.

Two Months Later

FIGURE 7A

FIGURE 7B

FIGURE 7C

FIGURE 7D

Two Months Later

Vegetative growth and development move along steadily. Heavy winds account for the exposed soaker hose, but no further damage observed to plants. Figure 7C shows the first yellow blooms of the prairie coneflower and Figure 7D portrays the brilliant bloom of the prairie lily pre-browsing.

Late-August (Three Months Later)

FIGURE 8A

FIGURE 8B

FIGURE 8C

FIGURE 8D

FIGURE 8E

FIGURE 8F

FIGURE 8G

FIGURE 8H

Late-August (Three Months Later)

Three months in and the garden is looking healthy as ever. Weekly watering and ample sunlight have provided perfect conditions for plant establishment. Figure 8C shows the early appearance of smooth aster blooms that will remain until late fall and Figure 8D shows the prairie coneflowers going strong with multiple blooms and seed heads. Figures 8E through 8H show the healthy vegetative growth of purple prairie clover, prairie crocus, early blue violet, and wild columbine, respectively. These plants dedicated their energies into establishing and will focus on flower production in the following year.

Public Presentation

FIGURE 9A

FIGURE 9B

FIGURE 9C

FIGURE 9D

Public Presentation

On September 14th, 2023, I gave an open presentation to the public through Westman Naturalists entitled Native Plant Gardening. Approximately 25 participants attended and listened as I explained the purpose, process, and highlights of native gardening within an urban environment. Following the presentation, several people approached me and enquired about my services in converting their lawns into native prairie species. Another percentage of the group enthusiastically told me about their own projects and invited me to tour their gardens. One of the main goals of this practicum was to inspire others to participate in ecological restoration in their own urban environments and hearing the excitement and eagerness to get involved and plant native species was outstanding. Photo credit to Erin Cox.

Photos from Sharon

FIGURE 10A

FIGURE 10B

FIGURE 10C

FIGURE 10D

FIGURE 10E

FIGURE 10F

Photos from Sharon

Throughout the entire process, Sharon has been messaging me with updates and observations she has made as the garden progresses. These texts have been full of excitement and wonder as new blooms appear or as various changes happen in the garden. This has been one of the most rewarding aspects of the entire project; witnessing Sharon's child-like wonder as she experiences her oasis of nature day-by-day. Photo credit to Sharon Enns.

FIGURE 11A

FIGURE 11B

FIGURE 11C

FIGURE 11D

FIGURE 11A

FIGURE 11B

2024 Spring Update

Given the scope and timeline of the project, I was able to collect photos of the garden after a winter season. Of the 168 plants purchased, only 4 have succumbed to winterkill, browsing, or desiccation. This low rate of loss speaks to the hardiness of the native species and to the time and care dedicated to them throughout the project. Also, having thoroughly enjoyed the native wildflower experience, Sharon has graciously asked if I can implement some new native species landscaping in her backyard. For someone who has stated she does not enjoy gardening, this certainly sounds like a lot of gardening to me.

FIGURE 12A

FIGURE 12B

FIGURE 12C

FIGURE 12D

2024 July Update

I had the opportunity to take a final look at the wildflower garden in July 2024. Both sections are healthy as ever and doing remarkably well. Figure 12D shows the prairie coneflowers in an abundance of blooms and Figure 12C shows an early appearance of Smooth Aster blooms. Typically, these do not show up until the end of August. I am not sure what has caused this premature blooming. Perhaps forest fires in the area and the heat have altered the conditions enough to trigger an early bloom. Figure 12A depicts a ground squirrel hole in the north bed garden. Sharen says this was present prior to the garden being planted and has reappeared likely due to existing tunnels underground. No damage to the plants has yet been observed. Sharon plans on smoking out the hole and filling it in to deter unwanted pests. Figure 12B shows the south bed with beautiful blooms in the purple prairie clover, prairie coneflower and the wild bergamot. Having marginally less sun in the south bed has not dampened the blooming capacity of the plants.

CHAPTER 4: CRITICAL REFLECTION

Background:

The inspiration behind this projection started in response to the abundance of doom and gloom in the media regarding climate change and environmental degradation, which got me pondering about potential solutions on an individual level. What could actually be done to improve the situation, as opposed to spiralling hopelessly into climate disaster? What could I do? While listening to an episode of "Growing Greener", an environmentally informed radio show that emphasizes the practices of ecological landscaping, I learned about an entomologist writing about using native species in their own landscape. In Douglas W. Tallamy's book, "*Bringing Nature Home: How You Can Sustain Wildlife with Native Plants*" (2009), the possibilities of addressing biodiversity loss are laid out into manageable, personalized actions. The book covers the potential for small-scale, local changes of habitat restoration toward an overall mosaic of biodiversity increase across the nation. This is all fine and dandy for restoration projects in Midwestern United States, but what about something closer to home? Something I can do in my own backyard? I was pleased to find that such a guide exists, and so I ordered Nature Manitoba's "*Naturescape Manitoba*" (2006) for more information on how this backyard level restoration could be done locally. Truly, the existence of this resources means that such ecological activities are taking place in Manitoba and that there is indeed a community and necessity for others to participate. Through improving urban environments with native landscapes across different sizes and scales, greater public appreciation and connection can be established, while at the same time supporting biodiversity and environmentally-friendly practices (Miller, 2006). This discovery

and insight propelled my interest further, so I decided to leave my occupation and pursue a master's in ecological restoration with the Natural Resource Management department at the University of Manitoba.

With the approval to explore different departments, I crafted a master's course program around landscape architecture, environmental conservation and restoration, ecology and design, and the revegetation of disturbed lands. Through this gained knowledge, I began a proposal for a native wildflower garden along the Bishop Grandin Greenway (BGG) that would educate and inspire the general community. I hoped that a project like this would have the same effect that Douglas Tallamy's book had on me.

I proposed the wildflower garden project to the BGG board and was met with enthusiastic interest and approval. The first challenge occurred when the governing board asked who would firstly pay for the project, and secondly, who would maintain it? I sheepishly suggested that the BGG would take full responsibility of the garden after installation and was met with scoffs of disapproval. Following this setback, I opened communication with the University of Manitoba concerning a similar garden design, this time located on campus. Members of the Physical Plant heard the proposal with keen interest, indicating that this kind of project is part of their modus operandi, but alas, the same questions of financial backing and long-term maintenance surfaced without any direct solutions from me.

By this point, I had completed my two years of academic courses and had returned to working full-time at Assiniboine Community College. I was speaking with the Sharon Enns, the resident librarian, about my challenges, to which she expressed keen interest. She volunteered to host my *naturescaping* project on her property as she had been experiencing similar concerns with the environmental conditions depicted in mainstream media. Burned twice, I explained to her the

financial elements, challenges and long-term maintenance requirements, to which she happily agreed, providing that I offer tutelage and support throughout (and following) the garden design, set up, and installation.

The Process:

Upon gaining approval from my thesis advisor and committee to proceed with the project, plans were designed and plants were ordered and purchased for the development of a small-scale wildflower garden in Brandon, Manitoba, located in the front-yard of Sharon Enns' property. The garden design prioritized species that would bloom all season, to provide a constant pollinator food source, but also to gift Sharon with aesthetically pleasing flowers to gaze upon throughout the season. This is a significant component in the differences between large-scale prairie restoration projects across acres of land and small, modest projects performed within homesteads and urban areas. When performing massive restoration projects, the seed mix and plant selection must include diversity, but focus primarily on grasses and other species to mimic remnant vegetation and natural conditions (Rowe, 2010). These factors in plant communities and their relationships must also be considered for small-scale operations, but to ensure success in project endeavours, presentation for the public eye must also be taken into consideration. A rewilding project cannot look like an abandoned yard site, but must instead display intention and design, otherwise, what will the neighbours say? (Vogt, 2023).

For the garden design, plants of varying ages were selected: an older, more developed example plant and then several younger plugs of the same species. This strategy is a way to provide example species of what more mature plants will look like and grow into, and also a cost-effective method as the younger, less developed plants are considerably less expensive. (Plug plants costing approximately one third of a full-sized plant). Having the example/demonstration

plant provides an opportunity for plant Identification and can show true leaves to avoid during weeding. Plant size, texture, colour, and spreading habits were also factored into the design. Larger plants being positioned in the back to avoid shading out smaller plants, but to also act as a visual backdrop and as structural anchoring support. The texture of the foliage provides equal contrast during the growing season, especially before and after blooming periods. In order to keep neighbours content, species with passive spreading habits were prioritized. Aggressive plants would not only outcompete the more timid, well-behaved species, but would also find themselves escaping into the neighbour's lawn.

Resource acquisition proved relatively simple and cheap given the size of the project. Soil amendment was ordered locally, and mulch was acquired free from the City of Brandon. This is good to know for future restoration endeavours, as the price point is one of the main concerns of potential clients. Plant availability and seed acquisition, (also important for genetic diversity), is the main limitation in plant design. It is best to mimic remnant prairies, but availability of resources ultimately determines the species included in a design mix (Morgan, 1995).

In late June, myself, Sharon Enns, and her husband met at her property to start the installation process. We started by outlining the intended area, excavating and turning the soil, and burying the existing grass and vegetation. Plastic siding lined the area to help control rhizomes from spreading, then two layers of cardboard was place atop the disturbed soil. Several wheelbarrows of the soil amendment topsoil were spread over the cardboard and distributed evenly throughout. Initially, 23 cm bamboo stick spacers were used to get the spacing of the plants (according to the garden design) in location. Later, direct lines of orange twine were used to create a more uniform grid for planting. Soaker hose and wood mulch was then delicately placed surrounding the plants and a thorough soaking applied. All in all, the process probably took the better part of 8 hours for

the two wildflower garden beds. Exhausted, covered in dirt and sunburnt, we had completed the installation. It is worth mentioning that the physical act of getting the landowner's hands in the dirt and getting them to help directly to establish the garden creates a much stronger emotional attachment and bond with the garden. Not just personal pride, but a maternal connection with the success of the species has been instilled in Sharon, a woman who avidly admits to a lack of green thumbs.

Throughout the remainder of the summer growing season and into the fall, the plants were monitored and observed (during watering, weeding, and regular maintenance) for any changes or losses. Other than some observed browsing from rodents, and some desiccated plants that may have not been planted properly, 96% of the recorded plants survived the initial growing season and appeared hardy enough to survive the winter.

Public Engagement:

Throughout the summer, Sharon regularly updated me with excitement as new species blossomed or different insects made use of the wildflower garden. It was exciting to see not only the plants growing, but also her appreciation for the little plant community we had created. With Sharon's approval, I was able to contact the Westman Naturalist group and invite them for a presentation regarding the wildflower project. Twenty-five individuals attended the public talk with varying levels of understanding and ambition. It was well-received and invitations for me to help design their gardens were given. So, by creating this small-scale habitat, others have been inspired to create their own manageable patches of wildflower gardens in their own spaces. To be honest, I think the majority of those who approached me after the presentation just wanted a fellow plant-enthusiast to share their personal restoration experiences with. It is inspiring that such a community exists within a small city as Brandon, but also that others are actively

engaging and participating in rewilding urban habitats. Perhaps the next time legislation and policy of municipal lawn regulations comes under scrutiny, a population of green supporters will be large enough to help vote and sway city bylaws restricting ecological practices.

Weeks after the public presentation, I got the opportunity to speak and reflect on the evening's event with Jennifer Wasko, the current president of the Westman Naturalists. We discussed the various levels of knowledge and competency within the audience, noting that the information spoken in the presentation may not have been anything new to some, but was perfect for the individuals that want to make an environmental difference, but do not have the gardening knowhow to do so. This combination of public outreach with supportive communities can be just the spark needed to promote ecological change in cities, adjusting the status quo, and eventually fracturing the societal norms of conventional turfgrass landscaping (Bretzel, 2016). Jennifer has since invited me to participate in various nature walks and other plant identification activities within the community.

Challenges & Assumptions:

Challenges arose due to assumptions that interested party members would be willing to fund and maintain the project on a long-term basis. Organizing and communicating with these interested parties proved difficult and infrequent. Minimizing the scope of the project into something more feasible proved much more effective, though less decadent.

Unforeseen frustrations occurred during the planting process with the homeowner becoming frustrated things were not going according to plan. Basically, the 23 cm bamboo spacers were not effective with three different individuals planting in unison. Hoping to avoid a disheartened meltdown, the orange twine grid system offered a much simpler guide for spacing and plant allocation. Improvements were made on the fly and everything worked out in the end.

Concerning plant health and survival rates, only four of the 168 plants were recorded as dead. Six or so plants (red lilies and purple prairie clover) were victims to animal browsing, but this had been expected and prepared for in the initial planning stage. Losses are to be anticipated and funding has been set aside to replace any species that do not survive or suffer winterkill. Sharon was absolutely mortified to find plants had been eaten, or even when single blades of grass were damaged, but I reassured her that this was the whole point of the garden, for animals and insects to use and that, if necessary, replacement plantings will be ordered in the spring.

Working full-time as an instructor during this master's project has also proven challenging. Being overwhelmed with course loads and timing constraints has proven detrimental to completing the master's project. Ideally, the project could have been completed prior to employment, but given financial necessity, employment was required.

Discoveries:

Besides the plant knowledge, landscape design skills, and ecological lessons I have studied through my education, I have learned that the interest is present for restoration but the scale may not always be realistic. I have had several people ask for me to design gardens for them and asked how much I charge; I have responded that I will do it for free as long as they pay for the materials and maintain the gardens long-term. Realistically, completing smaller, more manageable sized gardens is much more feasible than all-encompassing prairie restorations, especially in an urban environment. People love the idea of greening an area but who isgoing to pay for it and take care of it? Getting people passionate and inspired about their own spaces and converting the societal norm from turf grass to wildflowers is definitely a step in the right direction. (What does someone even charge for these kinds of services? More research needed.)

Because of my public talk, I have since been asked to return to the Westman Naturalists for interpretive walks through forest and prairie ecosystems, highlighting native species and their potential for being utilized in garden spaces. There interest and inspiration are out there, people just need guidance in the right direction.

I have also learned that the timelines of restoration projects span much longer than the two (or so) years allotted for a master's project. Most major wildflower projects take at least 2-5 years to get properly established, especially when starting from seed. Starting wildflower projects in community gardens is possible but the long-term management plans must be put in place before taking part in their installation.

If I could do it again:

I would have loved to have worked on a larger-scale restoration project; something really immense and awe-inspiring. If I could have done this master's again, I would have done more surveying or canvasing for interest. It would have been nice to partner with conservation groups such as Nature Conservancy of Canada or larger organizations like Manitoba Hydro or the City of Winnipeg, but with larger projects comes the loss of personal control over the project. More constraints would have been in place, especially around design and budget. Realistically, I did reach out to these organizations and other similar parties, who all had initial interest but lacked the available resources to properly commit to my project. The Winnipeg Wildflower Project (WWP) were incredibly helpful with their support and communication during volunteering sessions. I helped install wildflower gardens in Transcona and along Waterfront Drive, and while do so, was able to inquire about the logistics of project/plant growing success and community involvement. To date, the WWP has five gardens located throughout Winnipeg and is constantly

asking for volunteers to help weed and maintain the gardens. Without that community support base, a larger scale urban project simply could not exist.

Skills Development and Knowledge Acquisition:

Besides the actual execution of the project itself, it would have been nice to have more hands-on experience with other restoration projects. I am grateful for the theoretical knowledge acquired through the courses: "Plants, Ecosystems and Design", "Revegetation of Disturbed Lands", and "Ecology and Design 2", but a summer co-op placement might have offered more direct experience toward this execution of this project. That being said, through researching papers, manuals, tutorials, guides, and doing the project itself, I was able to gain valuable insight into the realistic expectations of ecological restoration in an urban environment and all the moving components of project design and development. To learn more, I just need to keep doing planting projects with different ecological requirements and conditions and to learn from the mistakes and lessons along the way.

Conclusion:

The initial goal of the project was to learn the ins and outs of designing a more environmentally-friendly ecosystem and to inspire others to do the same. Through this project, and Sharon's contagious enthusiasm, I have been able to design a full garden design with fourteen different native species, convert 130 square feet of unproductive lawn into prairie wildflowers and grasses, and encourage other members of the community to do the same. This may not be the Lurie Garden in Chicago or the High Line in New York, but it has caught the attention of local enthusiasts and may provide some shelter and resources to native pollinators who otherwise would not have had it.

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APPENDIX

INTEGRATED PROJECT PLAN

Executive Summary

The main purpose of this project is to address native habitat degradation and biodiversity loss within urban environments. The project aims to create an example of a wildflower garden that highlights native plant and pollinator species and yet remains aesthetically pleasing within a site design and curated landscape. The intention is to firstly, repurpose a small-scale lawn into a biodiverse wildflower garden and secondly, to educate and inspire observers to create their own local wildflower patches, therefore helping to create a matrix of native habitats throughout an urban environment.

Teaming with Sharon Enns (landowner), the wildflower garden will be installed in the highly visible front lawn of 1745 10th Street in Brandon, Manitoba. This project plan explores the necessary components of the garden, the development plans, management and tasks, risk evaluations, budget plans, and planting assessment.

Project Scope

1. General Information
    a. Project name: Wildflower Garden
    b. Project Manager name: Ben Horne
    c. Project Sponsor name: Sharon Enns
    d. Project Number: 1
    e. Date: 2023-05-23

2. Project Overview

    Urban sprawl, intensive industrial agriculture, and environmental degradation have led to the loss of significant native prairie habitat throughout Manitoba, endangering a plethora of native plant and animal species. By collaborating with a local nature enthusiast and homeowner, this project aims to create and increase prairie habitat patches within urban environments and green spaces. With the inclusion of habitat examples via indigenous plant species, this project will not only provide a prairie patch within Brandon, but also aim to inspire others to build (and conserve) their own potential native habitats.

3. Project Goals and Objectives

    a. Plan, develop, install, restore, and beautify a garden of prairie habitat at the Enns Property by Fall 2023.

    b. Design a mirrored garden blueprint incorporating plant species' heights, textures, colours, growth habits, blooming periods, and potential ecological benefits.

    c. Connect community members and environmental enthusiasts by hosting an educational presentation with participation activities for the community. This will likely occur onsite with planting demonstrations and potentially talks from local experts.

4. Comprehensive List of Project Deliverables

    a. A design and plant list will be created prior to installation to ensure restoration outcomes, aesthetic layout, and quality control. The design will be reviewed (by project partners) and updated should new components arise or no longer be deemed necessary. The garden will not be successfully implemented if not designed properly or without partner and sponsor approval.

    b. To parody prairie habitats with a prairie garden demonstrating native species in an urban greenspace. Success may be measured by biodiversity, plant survival rate, and the measured biomass or canopy cover of plant species.

        i. Biodiversity will be observed based on the total number of plant species introduced and the amount that have become established by the end of the growing season in 2023. Further plant observations may be recorded in June 2024. Plant size will be photographed and documented after installation in June 2023 and then again at the end of the 2023 growing season.

    c. Community building deliverables include:

        i. curated volunteer-based installation activities,

        ii. maintenance “worker bee” marathons,

        iii. public talks from local experts to naturalist groups,

            1. Success factors will be based on attendance and volunteers, through involvement with community members.

5. Comprehensive List of Project Requirements

The Garden Design:

The layout for the garden will include a map, list of all included species, spatial aspect, area measurements, proximity to infrastructure, any inclines or topography of note, version numbers, partner approval requirements, and a legend depicting any symbolism used.

Species diversity.

The garden must incorporate the use of native wildflowers and grasses, (with options for shrub and tree species) specific to that location and growing conditions in order to foster habitat restoration. Species with high productivity use and capacity toward native pollinators should be highlighted and prioritized.

Plant succession will also be incorporated into the project design. An older, more established plant from each species type will be used to demonstrate the growth stages of that species and make identification easier as younger, less developed plants progress. This technique also allows for a more affordable and price-conscientious planting budget by providing a developed plant long before the less developed plugs can reach maturity.

Aesthetics.

Creating a garden using the elements and principles of design will help facilitate positive associations and experiences among visitors. Beauty is not a requirement of a restored habitat, but it will help guarantee the success of positive human interactions in a public garden space. The placement, variety, colour, size, shape, texture, winter interest, and blooming season should be taken into careful consideration when designing a green landscape. After witnessing the potential of native wildflowers, perhaps individuals will consider using them instead of the usual common garden cultivars. If it looks beautiful, people will cherish it and be more likely to mimic it with gardens of their own.

Navigation.

The garden must be logically designed to allow easy access and navigation. The flow of the garden should allow for restful reflection, contemplation, and consideration, but also spur curiosity and creativity. These can be difficult qualitative measurements to assess, but worthy influences throughout the design period.

Instructional Signage:

Included signage will be necessary for simple species identification (for owners and onlookers) and to promote bee-friendly gardening practices. This is in anticipation of individuals or homeowners' associations complaining or feeling negatively toward the project. Proper signage will show intention and provide a more deliberate approach to gardening. The information on the signs will primarily consist of common names and scientific names of each species. Additional information may be provided, budget permitting.

Community Involvement:

A public speaking event will be planned around volunteer interest. Participants will be educated on the details of the project, the proper methods for installation and maintenance, and then will be provided with refreshments and a limited amount of free native seeds for their own gardens. The community event component is dependent on interest and plausibility of public engagement. Westman Naturalists and other NGOs will be considered for involvement. Anticipated number of participants is approximately 10-20 individuals.

6. Exclusions from Scope

    a. Public engagement. Any press or public outreach following the installation of the garden will not be planned within the project.

    b. On-going maintenance. As the project must have an end date, future maintenance of the site will try to be addressed but is outside the scope of the project. This includes weeding, watering, and general maintenance.

        i. As the plants become more established (estimated three years), they will no longer require as much watering or weeding. Simply seasonal mowing will help maintain their quality.

        ii. As plant species develop, the species present may vary and alter from the original garden design.

    c. Property damage. Any graffiti, vandalism, or natural disaster will be outside the scope of the project. This includes wildlife-related damage.

    d. Volunteer transportation and equipment.

7. Resource, Time, and Cost Estimates

NOTE: A more in-depth Budget Summary is included later in the document.

    a. Estimated budget is dependent on the land size/scale of the project. $500 – $2,500.

        i. Feasibility study on location prospects.

        ii. Resources: plants/seeds, soil-amendments, water, mulch, cardboard.

        iii. Supplies & Equipment: shovels, rakes, wheelbarrows, tools, tiller rental, etc.

        iv. Infrastructure: pathway materials, siding, pond component, potential bat and bird box materials, etc.

v. Labour and Maintenance site preparation, weeding, planting, sowing, watering, harvesting, etc.

vi. Signage: designing, printing, and manufacturing fees.

vii. Transportation expenses.

viii. Advertising & Marketing: photographer, graphic designer, social media representation.

ix. Refreshments (volunteer relationship maintenance)

x. Emergency and unexpected expenses.

b. Installation could take 1-2 years. This is dependent on soil/planting conditions (terrain, weeds present, nutrients, weather conditions), access to resources, funding, volunteer numbers and expertise, maintenance, and replanting.

i. Site preparation (weed extermination) is planned for spring 2023, installation of garden for summer 2023.

ii. Following COVID-19 safety regulations may inhibit timing. (I.e. number of people present, social distancing, etc.)

1. High-Level Requirements:

a. In terms of individual requirements, the Project Manager (Ben Horne) is expected/required to:

i. Research, plan, organize, install, and maintain the garden by fall 2023.

ii. Design and produce educational material (in multiple languages) to be displayed appropriately on on-site signage.

iii. Acquire and manage funding through grants and sponsorship.

iv. Communicate with all interested parties regarding progress, updates, and events.

v. Networking with local community contacts of interest (I.e. volunteers, educators, residents, suppliers and retailers, landscape designers, elders, supporters, and potential sponsors).

b. The Project Partner (Sharon Enns) is expected/required to:

i. Provide planning and guidance throughout the entire project, specifically with plant selection, installation requirements, site maintenance and preparation responsibilities.

ii. Aid in site preparation and maintenance organizing.

c. The Academic Advisor (Nicola Koper) is expected/required to:

i. Educate, direct, and support the Project Manager throughout the entire project.

8. Roles and Responsibilities

a. Project Manager: Ben Horne

b. Academic Advisor: Nicola Koper

c. Project Partner/Landowner: Sharon Enns

d. Indigenous Knowledge Consultant: Marshall Birch

e. Sponsors: TBD

f. Landscape Designer: Ben Horne

g. Signage Graphic Designer: Andrea McDougald, Erin Cox

h. Wildflower Restoration Contact: Winnipeg Wildflower Project

9. Assumptions

a. It is assumed that supplies (plants, mulch, soil amendments, infrastructure) will be available for purchase and use.

b. It is assumed that volunteers will be available (and capable) to assist in the installation and upkeep of the project during work events.

c. It is assumed that the plants will be able to grow. It is a measurement of the project's success whether the plants grow the following year(s).

i. Preferable weather conditions fall under this category.

d. It is assumed that Sharon Enns will maintain management of the garden property and stewardship will not change hands during the project. This assumes that the location will always be available for use throughout production.

e. It is assumed that pollinators and wildlife will use the garden.

f. It is assumed that public viewing access to the garden area will be available upon completion.

g. It is assumed that the sponsors will remain in support of the project from production to completion.

10. Project Acceptance

The project will be completed by fall 2023. Success will be determined based on species recovery percentage and will be inspected by the project partner for quality assurance. If at least 60% of plant species remain, have established, and are deemed healthy enough potentially to produce seed, then it will be considered a success. If there is less than 60% return, a replanting will occur based on funding and resources available. Diversity of species renewal will also be taken into consideration; if less than 60% of plant types return, a similar replanting will occur, but potentially with different species, based on availability.

Signage must also be present within the garden. Success will be determined based on the quality and components of the signage material. The physical quality and durability of the signage is also a key component for success.

11. Constraints

a. Seasonal/Time constraints. Soil is only workable during certain times of year and plants require time to properly establish a root system before the ground freezes.

b. Funding. The budget acquired limits the scale of the project. Multiple case scenarios will be developed to plan for budget amounts. (I.e. low budget, medium budget, ideal budget outcomes). Funding amounts may affect the timeline of the project.

c. Supply availability. Plants will be purchased from the retailer Prairie Originals in Selkirk, MB. They may only have a certain amount of stock available. Some plants are more difficult to propagate/cultivate. Wild seeds and plants may be foraged whenever possible.

d. Location. The amount space available constrains the scale of the project.

    i. The landowner of the location may also constrain some of the project possibilities should they consider them unfit for implementation.

e. Environmental conditions. Soil type, sun exposure, drainage, and other factors will affect or limit the variety of species chosen. Weather events may also burden progress.

f. Water access. This may limit the scale of the garden based on expenses and plant needs. May also affect budget more than anticipated if it is a dry year.

g. Weed and wildlife exposure. Weed coverage is anticipated but severity may vary. Actions are taken to reduce weed impacts, but they are expected to still occur. Wildlife (deer, rabbits, ground squirrels, etc.) may also impact the project. Fencing could help reduce risks, but wildlife impacts should still be anticipated.

12. Signatures

a. Ben Horne _____

b. Nicola Koper _____

c. Sharon Enns _____

Project Scope Management Plan

In order to properly create the project scope, work breakdown structure, and network diagram, meetings and contact with Nicola Koper, Sharon Enns, and the City of Brandon will take place. Each meeting will help determine and outline the expectations, requirements, possibilities, limitations, and timeline of the project. Following a meeting(s), the issues discussed will be documented, and updates/changes will be made to the scope and WBS to reflect project development. Project scope updates and review should take place monthly to reduce chances of scope creep. The Project Manager must be included in all meetings and based on the results of any meeting, will update all other interested parties accordingly with any potential scope adjustments.

a. Meetings with Nicola Koper will occur more frequently, on a regular basis (monthly), and will help refine the details of the project. With each successive meeting, the project scope and WBS should be updated to reflect any new components discussed. Meetings with Nicola should take place following meetings with other personnel. These meetings may simply be e-mail correspondence with zoom meetings used when necessary.

b. Meeting with Sharon Enns will help set the initial scope of the project. Their advice and counselling will determine what is possible, what is to be expected, the required resources, and the timeline for the project. They may also have experience with designing, installing, and maintaining the project, which will help shape the expected timeline and cost estimates of the project. Meetings should occur monthly during the winter and more frequently during the planting season.

c. Meeting with other sponsors may help establish potential (and final) locations for the project. Each interested party will provide expectations, limitations, and potential funding for the success of the project. Meetings with these parties will occur less frequently and will involve updates to project progress and phases.

Sequence Network Diagram

1. Project meetings to establish scope.
    a. Determine location.
    b. Apply for funding.
    c. Contact graphic designer.
    d. Contact City of Brandon's official environmental stewardship department.
2. Research for requirements necessary to fulfill scope.
    a. This includes suppliers, participants, and volunteers.
    b. Research species requirements and availability.
3. Create social media account(s). (This is part of documenting the process publicly).
4. Development of garden design layout.
    a. Meetings to make design official.
5. Informational signage creation.
6. Site preparation.
7. Site installation.
8. Site maintenance.
9. Site monitoring.
10. Site follow up and assessment.

Milestones and Responsibility Assignment Matrix

Milestone	Expected Completion Date	Actual Completion Date
Garden location acquired	May 2023	
Funding acquired	June 2023	
Design layout completed	June 2023	
Plants acquired and installed	June 2023	
Signage Printed and installed	August 2023	
Quality assessment	September 2023	

Skills Inventory and Materials, Supplies and Equipment List

Task or work package	Skills needed	Level of Experience	Potential Team Member
Design garden layout	Landscape design	Experience is an asset	WWG, Nicola Koper, Becky Filopoulos
	Knowledge of native species		
	Horticulture experience		
Public Outreach	Communication skills	Experience is an asset	WWP, Westman Naturalists, Bee City Brandon
	Network of interested parties		
Informational Sign Creation	Knowledge of native species	Experience is an asset	Andrea McDougald (Graphic Designer)
	Design and software skills		
Garden installation	Gardening skills	Experience is an asset	Volunteers, classmates
	Knowledge of native species		

- **Basic garden implements**
    - Shovels, rototillers, tarps, wheelbarrows, etc.
- **Water**
    - Provided by Sharon Enns and precipitation.
- **Plants**
    - Seeds, plugs, trees, saplings, shrubs. These will be acquired from Prairie Originals and potentially in the wild. Depending on budget, a variety of seeds, plugs, and 4.5” potted plants.

- **Graphic Designer**
    - Most of the work will be completed by Ben Horne but some consultation on design may be necessary. Andrea McDougald has offered to volunteer her time.
- **Signage**
    - Roughly 2” x 3”. Label signs for each species, duplicated for the mirror beds. WWP have used the company Signs Now in the past and have been satisfied with their quality. Prices vary. Approx. $100.
- **Mulch**
    - The City of Brandon Waste Management Facility provides free mulch access to the public**.**
        - If the woodchips are unavailable, flax bales will be purchased and implemented.
- **Pathway materials**
    - This could be bricks or stones or paving, and all dependent on budget. The pathway likely will be a mowed trail or woodchips.
- **Added value**
    - Bat house, bird houses, bee hotel materials. Could be scraps of wood, could be newly purchased, dependent on availability. Tools and materials required for assembly and installation. Dependent on budgeting.
- **Compost/Soil Amendments**
    - Compost and soil amendments may be sourced through the City of Brandon or purchased externally at an appropriate retailer. Budget dependent.
- **Storage for equipment**
    - Equipment may be stored on the Enns property temporarily.
- **Refreshments**
    - This is dependent on the number of events and volunteers needed to install and maintain the garden. Could likely budget $50-100 for each event, depending on total number of participants. Perhaps a company would be interested in catering/donating for the event.

Relationship Management

Interested Party	Mechanism	Purposes	Timing
Direct Connection Cluster	E-mails, zoom meetings, In person meetings. Grouped if necessary. Mechanism based on more frequent correspondence	Information updates, collaboration, approval, quality control, brain storming	Monthly or event based, more frequently during growing season
Nicola Koper Sharon Enns **Land Owner Cluster**	E-mail / Newsletter. Separate. Efficient, informative, and direct contact method.	Update information, seek approval, funding/resource requests	Event based / when necessary. Infrequent.
Sponsors **Indigenous Knowledge Keepers Cluster**	E-mail / Newsletter. Grouped. Efficient, informative, and direct contact method. (Zoom meeting if something more personal/formal is required.)	Initial contact to determine interest. Update information, seek approval, funding/resource requests	Event based / when necessary. Infrequent.

Local/Community Organization Cluster	E-mail / Newsletter. Grouped & separate. Efficient, informative, and direct contact method. (Zoom meeting if something more personal/formal is required.) Instagram direct message when possible.	Initial contact to determine interest. If interested: update information, funding/resource requests, volunteers	Event based / when necessary. Infrequent.
Specialist Cluster	E-mail or zoom. Zoom for live interaction as questions may arise. Separate. Instagram direct message for initial interaction.	Initial contact to determine interest, introduction to project, establish relationship, request knowledge & skills, funding, support. Update on information if desired.	As questions arise. More frequently if interested in participation.
NGO Cluster	Instagram direct message. Zoom if possible. Separate. Personal touch.	Request support.	Project update based, more frequently if interested is established
Social Media Cluster	Instagram direct message. Separate. Easy way to connect.	Determine interest, request participation and support. Update information if they request it.	Project update based, more frequently if interested is established

Work Breakdown Structure

1. Wildflower Garden Project
    i. <u>Garden Design Layout</u> (Start: 1/5/2022. End: 15/6/2023.)

0. Document landscape attributes of garden location via site inspection.
    a. Measure the dimensions of the property.
    b. Record topographic details. (Slopes, existing vegetation, infrastructure, drainage.)
    c. Perform soil test to determine nutrient content, salinity, soil texture, pH levels).
    d. Locate the nearest water source.
1. Map out site attributes based on recorded observations.
    a. Map out desired plant locations upon completion of plant list.
    b. Map infrastructure component locations.
2. Research and create desired plant list.
    a. Record each plants' blooming period, soil preference, cost, colour, texture, and associated pollinator species.
        i. Document costs for seeds, plugs, and potted plants.
    b. Include images of each species for reference.
3. Create multiple design layouts for consideration and partner approval.
4. Organize maintenance schedule (times for weeding, watering, and by whom.) Fertilize if necessary.
5. Meet with project partner and academic advisor throughout the creation of the design. Update accordingly.
6. Research and apply for funding and sponsorship.
    a. Develop multi-tier budgets based on expected costs and acquired funding.

ii. <u>Wildflower Garden</u> (Start: 1/6/2022. End: 31/08/2023.)

0. Site preparation.
    a. Organize volunteer duties and expectations, if any.
        i. Manage and oversee progress. Appoint group leaders if necessary.

b. Remove existing vegetation.

    i. Use clear plastic tarps to germinate weed seeds, kill plants, and reduce exotic species seedbank. Avoid the use of chemicals for weed suppression.

    ii. Physically remove existing turf.

        1. Create compost mound for undesired vegetation. To be disposed of upon completion of garden installation.

c. Stake out dimensions and clearly label beds and plant locations based on garden design layout plan.

d. Incorporate compost, manure, soil amendments via tilling.

e. Photo document entire process for records and social media.

1. Plant and signage installation.

    a. Acquire plants from Prairie Originals and deliver them to garden location.

        i. Place each plant on top of intended planting location based on design layout.

    b. Plant each species in appropriate location. Double check garden design layout to avoid errors and incorrect placement.

    c. Water plants.

    d. Install identification signage appropriately located near related plantings.

    e. Install access points and pathways.

    f. Cover spaces between plants with woodchip mulch to reduce weeds and maintain moisture levels.

2. Site maintenance.

    a. Weed, water, mow based on volunteer duty schedule. This could be done individually or with a group based on necessity.

    b. If necessary, establish connection with Manitoba Master Gardener programs to create continual maintenance

agendas post-project. More than likely, the homeowner will oversee maintenance.

3. Assessment.
    a. Observe and document garden condition continually based on project scope expectations. Record each inspection and compare.
        i. Record any discontinuity and correct errors assuming time and budget allow.
        ii. Weekly documentation may be incorporated to monitor quality.
    b. Final assessment one year after planting to help determine success of the project. Specifics for success to be established in scope prior to inspection.

iii. <u>Signage:</u> (Start: 1/6/2022. End: 31/08/2023.)

0. Species identification signage will be created to help with landowner identification as well as for observers. This will allow visitors to know which species they may consider for their own projects.

1. Production.
    a. Research the costs, materials, and potential companies for printing signage. Budget accordingly.
    b. Signs may be printed using 3D printers.

iv. <u>Community Engagement:</u> (Start: 1/6/2022. End: 31/08/2023.)

0. Organize and inventory potential volunteers.
    a. Contact project partner(s) for list of expected volunteers based on previous naturalist events.
        i. Endeavour to maintain these relationships. Meet with volunteers individually at site events, show appreciation, provide refreshments.

1. Create and develop online presence via social media.
    a. Create social media accounts to advertise and document progress. Tag involved interested party members where

appropriate. Photograph development and include images of desired native species.

b. Use followers as a source of potential volunteers through posts and outreach.

2. Organize events.

    a. Plan events and dates for site preparation, planting, and maintenance. Advertise via social media.

    b. Contact local specialists to determine interest levels for public presentations and activities.

    c. Public speaking opportunities to engage and teach others how to create their own prairie wildflower gardens.

Resource Requirements

The key physical resource requirements are based on the biological maintenance of plants and any tools required for upkeep. This includes items such as water, soil amendments, compost, mulch, fertilizer, storage, etc. Human resources include the physical labour required to install and maintain the project. This may include volunteer efforts or bi-weekly maintenance duties overseen by the project manager. Transportation and delivery of plant materials and equipment will also be a required.

Category	**Materials Needed**	**Quantity**	**Availability & Procurement**	**Approximate Cost**
Physical Resources	Soil amendments	12 m^3	City of Brandon	Donation based (Free - $250)
	Wood chips / mulch	15 m^3	City of Brandon / Arborist	Donation based (Free - $250)
	Water	Weekly	Sharon Enns, rain	Indeterminate
	Plant Material	125 m^2	Prairie Originals	$500 - $1,000
	Equipment & Tools	as needed	Sharon Enns	Donation based / Whatever is available
	Identification Signage	30 signs	TBD	$50
	Temporary fencing	110 m	TBD	$100-200
Human Resources	Installation	as needed (1-5 people, 10-20 hours)	Sharon Enns, Volunteers	Donation based
	Upkeep/Maintenance	Biweekly (2 people, 2 hours)	Sharon Enns, Volunteers	Donation based
	Transportation	as needed	Personal	$200

Procurement

The City of Brandon has offered to provide mulch, and soil amendment materials already available at City Deposit locations. The delivery and installation will require machinery operation and staffing hours. Specific dates must be arranged with the City of Brandon for availability and resource amounts. Installation should take place as soon as the ground has thawed after the last frost date, approximately June 2023, but potentially later into the season.

The Winnipeg Wildflower Project has a dedicated group of volunteers that will be notified prior to the installation date to determine knowledge and skill levels, personnel quantities, availability, and interest. These volunteers will be called upon for biweekly maintenance and upkeep (weeding, watering, observation) and will be expected to provide their own transport and equipment (shovels, gloves, PPE). Given the size of the project and its location in Brandon, MB. It is unlikely that excessive volunteers will be needed or available. This will be education and interest-based in likelihood of delivery.

The plant material will be purchased and acquired from Kelly Leask of Prairie Originals. They will be delivered to the project site once site preparation tasks are completed. This will be coordinated with expected installation dates and volunteer availability. Plants should be ordered in Spring 2023 to allow for inventory confirmation.

Fencing and signage will be purchased and installed following plant installation. The fencing schedule will be more reliant on plant installation as to protect new plantings from deer browse. Signage may be installed later in the season. Cardboard materials will be collected prior to plant installation.

Skills & Knowledge Acquisition

The necessary skills and knowledge to complete this project revolve around plant biology, horticultural design, and digital mapping and design. The information required will be obtained through environmental classes provided at the University of Manitoba, as well as through conversation and inquiries with the plant experts in the Winnipeg Wildflower Projects and Nicola Koper. Additional skills and knowledge acquisition will be through a literature review, as seen in the appendices. Based on their experiences with project installations, garden designs, species lists, and project management, sufficient knowledge will be accumulated to ensure the success of this project.

The identification signage displayed will be approved by Sharon Enns and the design components will be assisted by local graphic designer, Erin Cox. The acquisition of skills and knowledge will be completed prior to the installation of the garden in June, 2023.

NOTE: See Skills Acquisition Chart in the APPENDIX.

Risk Management

1. Budget / Funding

Avoid & Share.

b. Avoid the risks of not having enough funds by increasing funding application efforts and reducing potential costs via contingency plans. Create three plans for optimistic, pessimistic, and realistic outcomes regarding total funding for a budget. This will be determined prior to execution of the project plan to help prevent going over budget.

Also, allocate up to 20% of total budget for unforeseen expenses and increased costs.

c. Share by involving Nicola Koper (Academic Advisor) and her networking skills and experience to help acquire additional funding and increase the potential for success.

2. Pests / Disease

Accept & Mitigate.

a. There is a high likelihood of weeds, pests, and diseases occurring throughout the life of this project. Risks include invasion or predation by insects, ground squirrels, deer, rabbits, invasive species, and other common plant diseases. Selecting a diversity of plant species will reduce the impacts of losing individual plants. Deer resistant species will be considered and prioritized. Based on site experience, deer have not been a significant problem, but temporary fencing may be necessary. Funds will be allocated in the event of fencing being required. Concerns over geese nesting and damages will be considered as to recognize the likelihood of occurrence. Ground squirrels are the more likely culprit for damages endured. Best management practices will be considered to avoid interactions with these pests.

i. Planting method will include seeds, plugs, and larger plants to allow for some plants failing initially and to ensure future plant establishment and progression. Amounts of each will be based on funding allocation.

ii. Site prep will be used to tackle initial weed populations. This involves using plastic tarps to suppress established weeds and terminate germinating weed seeds. Hand weeding will also take place for inevitable weed occurrence.

iii. Herbicide spraying will be avoided but may be implemented if absolutely necessary. Mechanical and biological best management practices will be prioritized over chemical responses.

b. In the event of significant losses of species, replanting may be necessary, if budget allows.

3. Weather Events

Accept & Mitigate.

a. Unpredictable weather events are going to happen, especially with the uncertainty of climate change. Using mulch will help prevent erosion, retain water, and reduce soil splashing onto the

plants. Planting a few weeks early or late of spring and fall will help reduce the chances of frost damage. Planting on an incline may reduce chances of water pooling and soil tests will be taken to determine soil texture, drainage properties, pH, and nutrient levels. A mixture of drought tolerant species will be used dependent on topography, aspect, and soil conditions. By testing prior to planting, this may mitigate some of the risks with plant loss and weather events.

4. Personnel Issues

Mitigate.

a. Volunteer resources will be used sparingly and will be rewarded with positive activities to help reduce the chances of burnout or disinterest. Positive activities may include guest speakers, appreciation gifts, refreshments, and games. (All dependent on COVID-19 restrictions.) Any work that does not require external people will be conducted by the project manager and the partners. Given in the small size of the project area, all maintenance and installation can be conducted without any volunteer assistance if necessary.

5. Political Issues

Accept.

a. If possible, written documentation will be acquired to reduce chances of last-minute location issues, but it is always possible that situations may change. In the event of the location changing, a new location with a second party may be required. Conducting meetings with local community centers and like-minded individuals will help determine interest and the possibility of site relocation.

b. If the site should change post-installation, perhaps an extension of timing may be necessary. The project does not work without a location. So far, all parties have agreed to work together in accordance with land rights and usage. Planning for a back-up location is the most suitable response to an alteration in location factors.

Quality Management

1. **Quality Standards and Regulations**

    a. The industry standards require project sites to prioritize species biodiversity and species locally sourced and native to the region.

        i. Sites must prove beneficial to pollinator species. Therefore, do not use chemicals or sprays that may in fact harm or kill pollinators and plant species.

    b. Regarding city regulations, lawns must be kept shorter than 6 inches according to Winnipeg's 2019 Livability Bylaw. As this project is different from a classic

lawn, an exception may be made. Communication with the City of Brandon Naturalization department is in process and permissions will be granted to produce a wildflower garden.

2. **Quality Criteria**

a. The Garden Design.

i. The garden design must indicate which species will be used, where they will be planted, infrastructure and pathway placement, be designed to scale, and be clear and easily interpreted by all interested parties.

ii. The specific locations of the plant species must be thoughtfully placed and not simply broadcast to mimic a prairie field. Species must be grouped or clustered dependent on complimentary colours, textures, and heights, bloom periods, and also by light and water requirements.

b. The Identification Signage.

i. The signage must be simple, yet informative. It is intended for general use and will not require too much information as to become encumbered with detail.

ii. The signage may contain illustrations or images of native plants, scientific names and common names.

iii. The materials for the signage must be weather durable. Using an additional surface will allow for easy replacement should the signage be vandalized/damaged.

c. The Wildflower Garden.

i. The garden must be biodiverse. This may include multiple tree, shrub, grass, and forb species. Species priority will be given to local mixed fescue prairie species, but in the event that a pond or riparian area is near the garden, wetland species may also be included. The plants must be suitable (biologically and historically) to the area.

ii. The garden must be aesthetically pleasing. This means designing and using species that bloom at different stages throughout the growing season, to allow for continuous blooms. Pathways and maintenance access must also be considered.

iii. Continued maintenance must take place to control weed populations and maintain a positive appearance for public perception and interaction. This includes garbage and debris removal.

iv. Species must remain healthy. This includes regular checkups, maintenance, and the replacement of lost species if deemed necessary. This will take place until establishment has been achieved. Any losses after that will be outside of the project scope.

v. High biodiversity and ground cover will help determine the level of quality required for the garden from installation and into the future. Exact plant and ground coverage values will be determined via the garden design.

3. **Quality Management Procedures**

a. Approval by the project partner(s) and sponsor(s) will be required at each stage of the garden implementation process. This includes approving drafts, interim reports, finalized documents, and approval of the garden during (and after) installation.

b. Direct supervision by the project partner during installation will help ensure quality procedures are followed by volunteer workers and any other participants. Corrections will be made if necessary. (e.g. replanting and redesigning.)

c. Signage will be edited and doublechecked before being printed to reduce error occurrence. The content will also face approval requirements through draft and publishing phases.

d. Sight inspections will occur weekly to biweekly until the final fall assessment. Corrections will be recorded and imposed as deemed necessary.

4. **Quality Management Roles and Responsibilities**

a. The project manager (Ben Horne) will be responsible for quality control throughout every phase of the project. Given the size of the project, this is considered an appropriately manageable task.

b. The academic advisor (Nicola Koper) will assist with editing and any proposal and formal requirements. Their role mostly involves guidance and assistance in approval processes.

c. The project sponsor (Sharon Enns) will oversee installation and volunteer activities, with the help of the project manager. The project partner will approval plans, critique, and provide insightful feedback for adaptations. They will approve garden designs before installation and provide critical feedback and desired requirements to meet their own standards and the standards of the project. As the project sponsor is the landowner, they will become caretakers for the wildflower

garden after the project has been completed.

5. **Approval**

   a. Project manager: Ben Horne _____ Date: _____

   b. Project sponsor: Sharon Enns _____ Date: _____

   c. Academic Advisor: Nicola Koper _____ Date: _____

Communications Strategy

Project Overview and Objective(s)

Prairie habitat restoration in urban environments.

Why Communication Plan is Needed – What is it intended to achieve?

- To determine interest levels in all parties. (Initial contact and continued.)
- Update interested parties on project progress reports. (This may provoke greater participation/interaction.)
- Project approval and quality control. (Relationship maintenance.)
- Information & guidance acquisition. (From all parties.)
- Support & funding establishment. (Necessary for project development.)
- Collaboration & community building. (Working with likeminded parties.)

Intended Audience(s)

Internal and external interested parties. (See Interested Parties Register.)

Key Messages

- Project updates. This could be frequent e-mails for directly connected parties or monthly newsletters based on different project phases. (This is for partners and interested parties that have expressed desires to be included or involved.)
- Continual support requests. (Keep sending applications for funding/sponsorship/grants/resources. This could be done monthly or as new parties become available, before and during project application.)
- Information acquisition. (asking specialists about their experience in similar projects and resources/methods they have used.)

Suggested Communication Vehicles with reasons for choices

- Instagram direct message. (Simple, direct, informal, conversational, used as initial contact and then switched to e-mail or zoom for more professional correspondence.)

- E-mail. (Used for more frequent communication, newsletters or questionnaires.)
- Zoom meetings. (With groups and separate. Used for more personal experience, putting a face to a name. Also valuable for presentations and relaying information and project pitches.)
- Phone calls. (Yes, some people still use phones.)
- In-person. (Eventually, some outdoor planting activities will take place. This method will be used with volunteers and organized project activities.)
- Social media posts. (An Instagram account with enticing visuals should be employed. This is a means of public outreach and support.)

Timing in relation to project stage or activities

- Project updates/Newsletters should be monthly. Anything more frequent may cause annoyance or participation burnout. Perhaps the first of each month for consistency.
- Direct communication with project partners may occur weekly/bi-weekly if deemed necessary. This is based on project requirements. Frequency will likely increase during project implementation.
- Funding requests should be continual to different parties. This could be the 15th of every month to ensure continued applications and requests are sent.
- Social media posts should be weekly. Perhaps something like "Wildflower Wednesdays" where specific species are highlighted and described. Pictures will help with education and remind followers of project goals.

Other?

- Public speaking events. WWP has experience with communication projects and educational speeches. This will help maintain community involvement and outreach.

Project Schedule

Task	Date
Finalize proposal	Jun-23
Apply and procure funding	Apr – Dec, 2023
Garden design draft	Feb-23
Garden design finalization	Jun-23
Resource acquisition and securement	May-23
Volunteer communication	Jun - Aug-23
Project implementation	Jun-23
Sign installation	Jul-23
Site assessment	Aug-23
Partner communication	Monthly
Advisor communication	Monthly
Site Maintenance	Bi-weekly

Budget Summary

Item	Ideal	Realistic	Bare minimum
Tools and Equipment	$1,000	$100	$0
Water	$1,000	$500	$250
Plants	$5,000	$1,000	$500
Graphic Designer	$200	$100	$0
Signage	$500	$100	$50
Mulch	$500	$250	$0
Pathway Materials	$500	$250	$0
Added value	$1,000	$300	$0
Compost / Soil Amendments	$500	$250	$0
Storage	$0	$0	$0
Refreshments	$200	$100	$0
Transportation	$500	$200	$0
Incidentals	$2,000	$1,000	$500
Per diem	$2,000	$0	$0
Total	**$14,900**	**$4,150**	**$1,300**

Funding will primarily be acquired through grants and donations from various NGO organizations, sponsors, and the landowner. As the project manager and the landowner already have gardening equipment, new investments may not be necessary. Where possible, free soil, mulch, and water will be prioritized. The project manager and landowner will make up the majority of the labour and maintenance requirements, but any volunteering will prove beneficial in this area. If possible, more time may be allotted to acquire the project funding.

Alternatively, with time permitting, a *Plan D* with a pure seed option could be made available. A seed mix that would cover approximately 500 sq. m and would cost $435. This would save in the plant budget but could take up to five years to properly establish. This option would also require significant weed removal and watering maintenance. In the interest of time, purchasing plant plugs would save 2-3 years in plant establishment.

Change Management

Requests for changes or alterations may come from external influences, partners, advisors, and the project coordinator. These changes should be agreed upon by all interested parties and communicated via monthly updates depending on urgency. Alterations will be considered during monthly project assessments based on necessity. An incidental budget has been included to allow for deviations from the initial project plan. Any and all alterations will be documented for future assessments.

APPENDIX II

Background Information Report / Literature Review

Introduction

The purpose of this literature review is the explore the potential of small-scale prairie restoration projects within urban environments, their importance, the methodology behind their implementation, and a brief overview of potential prairie species and the pollinators they host. Educating urban populations in ecological principles with examples of how lawns and green spaces can be converted to natural habitat can help with increasing the levels and quality of biodiversity in cities (McKinney, 2002). As human disturbances are the primary cause of biodiversity loss, increasing efforts of conservation and restoration within human settlements can help to reverse this trend and help increase environmental awareness as a whole (Miller & Hobbs, 2002). Humans must alter their current environmental-degradation trajectory and embrace the potential of ecological restoration endeavours, large and small, rural and urban, in order to avoid certain environmental collapse (Miller, 2006).

Why are prairie gardens important?

With the increase of industrial agriculture practices and the onslaught of urban sprawl, habitat and biodiversity loss are at the forefront of negative environmental issues (McKinney, 2002). The spread of invasive species, unfettered pollution, and climate change are all leading to the loss of the habitats that support plant and animal species (Venhaus, 2012). Fortunately, there are innovative ways that habitats and biodiversity can be improved on personal, manageable scales. Small patch networks and green corridors of restored ecosystems (such as prairie gardens) can be built and designed to offer oases for nature in over-urbanized landscapes (Angold et al., 2006). By utilizing plant species native to a region that have grown and adapted with the pollinator populations for thousands of years, it is possible to convert barren landscapes of monoculture turf-lawns into diverse, ecologically-friendly environments.

Prairie gardens can help to promote biodiversity through conservation and restoration. Traditionally, lawns consist primarily of Kentucky bluegrass (*Poa pratensis*) and a small number of other turf grass species. These grasses can only support a handful of pollinator and wildlife species, whereas prairie garden landscapes are capable of supporting a multitude of native species, from plants, bees, butterflies, and songbirds. By simply including these native species into garden designs and landscapes, an increase in species richness and abundance can be observed when compared to traditional turf-grass lawns (Burghardt, 2009). Not only do prairie gardens help shelter and support the wildlife species using them, they also help to conserve the plant species and genetic diversity of the native species that make up the garden.

As native bee populations are experiencing declines across North America, researchers in Kansas City, Missouri have recorded the abundance and diversity of bee species observed in remnant prairies and also restored, organic prairie gardens. The study showed that be species were more

prevalent in remnant prairie ecosystems (highlighting the importance of conservation), but that significant numbers of populations were also recorded in restored, urban prairie gardens. These observations emphasize the complimentary roles that prairie gardens may provide in supporting pollinator species in challenging urban environments (Gastreich, 2020).

Using native species in prairie gardens can also aid in soil conservation by enhancing soil health via their unique ecological characteristics. The average root systems in turf-grasses average approximately six to ten inches into the soil, whereas the roots of big bluestem (*Andropogon gerardii*) have been recorded as deep as five to eight feet in northern latitudes. These roots decompose within the soil and provide a wealth of organic material to the soils, while allowing for water infiltration, soil structure and stability (Flanagan, 2005). Though not as prevalent in urban environments, including native species into a lawn or property helps to reduce compaction and erosion during weather events (Wilsey, 2006).

Compared to turf grass species, native prairie rain gardens are also known to provide greater water infiltration and drainage qualities in both sandy and clay soils. A study conducted by the U.S. Geological Survey compared the effectiveness of drainage qualities and managing stormwater for different vegetative rain gardens. The turf grass gardens were more likely to become over-satured, as their vegetative properties provided less storage capacity than the native species (Selbig, 2010). By emphasizing the use of native species over traditional turf grass lawns, the negative effects of intense weather events could potentially be reduced, perhaps even on a city-wide scale. Given the drought tolerance and adaptability of native species and the fact that they do not require as many inputs (fertilizer and water) as traditional turf grasses, the simple reduction in the amount of water resources being allocated to prairie gardens instantly aids in water conservation, especially during dry, drought periods exacerbated by climate change (Vogt, 2023).

Using native species can also help mitigate some of the consequences of climate change given their tolerance to extreme conditions and low requirements for traditional garden inputs. Not only do native prairie gardens help sequester harmful carbon dioxide, they also help to reduce greenhouse gas emissions in that they do not require the same irrigation and fertilizer additives that lawns do. Though it is necessary to further investigate these comparisons under different site and soil conditions, studies have shown that prairie gardens helped to store greater amounts of carbon in the soil than that of traditional lawns (Livesley, 2010).

Environmental and biological benefits aside, prairie gardens also provide educational and cultural values to be considered (Davis & Slobodkin, 2004). Native plant species have traditionally been used as medicines and sacred plants by Canada's Indigenous populations long before colonial lawns were ever an item of contention in North America. The prairie and grain plains landscapes hold historical heritage in many regions and through restoring and conserving prairie gardens, these cultural values can be preserved for future generations (Turner, 2012).

What is known about designing and establishing them?

This information has been compiled referencing the following restoration and design manuals and guides:

- Prairie Up by Benjamin Vogt
- Restoring Nature's Place by Jean-Mare Daigle and Donna Havinga
- Native Plants for Prairie Gardens by June Flanagan
- Nature's Best Hope by Douglas W. Tallamy
- Naturescape Manitoba by MB Naturalist Society

Several steps go into the design and implementation of a naturalized prairie garden. Many key considerations need to be taken before planting begins including a selection of plants that are suitable for the growing conditions of any particular project site. Assessments of the site itself need to be made to help determine which plants will thrive and mix together well. A design must be drafted, implemented, and followed that allows for unexpected outcomes or events, such as sudden plant failure, unavailability of certain species, and changes in a client's desires or budget. Once a design and site assessment have been completed and the plants are formed into appropriate groupings, soil and site preparation must be undertaken. This involves the introduction of soil amendments and any form of mulch that may be necessary. Upon completion, hardscaping and pathways must be installed and then the careful planting of the selected native plant species. Restoration projects do not simply end after the plants go in the ground but require a routine of watering, weeding, and general maintenance for the first few years to aid in the establishment of the plants. Once established, the prairie garden should be allowed to grow and mingle into a dynamic planting arrangement that will evolve differently each season. The following section breaks down the various steps for designing and establishing native prairie gardens in urban settings.

Research. A site assessment of growing conditions such as light exposure, moisture levels, soil texture and nutrient amounts, slope, existing vegetation (native and invasive), potential pests, and the history of the site should all be researched and evaluated in order to truly understand the requirements of the restoration project. Speaking with landowners should be able to answer some of these requirements but additional observations and testing may be necessary to achieve better comprehension of the situation. Soil sampling to determine nitrogen, phosphorus, potassium, pH, and salinity levels may be necessary. Native species typically thrive under poorer soil conditions, so an influx of nutrients may cause certain plant species to show excessive vegetative growth that can lead to plant lodging or other unforeseen complications.

Once the location and growing conditions have been comprehensively assessed, research should be carried out to determine a plant list of appropriate species native to the local biome/ecoregion. This list will be influenced by what is available from plant nurseries and whether seeding or plugs will be utilized in the planting process (time-line dependent). Wild seed collection may also be considered, depending on budget and time permitted. Plants should be selected based on their moisture requirements; drought-tolerant species will perform better in sandy, dry conditions than wet loving species in clay. In terms of aesthetics in garden designs, plant qualities such as colour, texture, height, form, blooming period, spreading and competition habits, and overall lifespan. Plants should be arranged with the largest at the back of light exposure as to allow smaller species light access. A diversity of textures and colours should be utilized and should give the impression of intention in a publicly visible landscape. Winter interest of dead-standing stalks and bark colour should also be considered for visibility outside the growing season. Flowering plants should also be grouped together to assist in the unity of the design but also because pollinators are known to visit the same species consecutively and a close design makes it easier for them.

Once plants have been selected and an understanding of soil and growing conditions has been completed, amendments may be administered as part of site preparation. Depending on time restrictions, existing vegetation may be removed and smothered for a season to reduce weeding competition and requirements in following years. Chemical applications may be most suitable for larger scale operations but may not be necessary for smaller, front lawn projects. Vegetation may be removed manually or smothered via plastic wrap or cardboard suppression techniques. Ecological gardening experts, like Larry Weaner, argue over the effectiveness of species suppression methods as it can impede the health of microorganisms present in the soil. Weaner suggestions sticking to living “green mulch” ground cover or only using permeable woodchips that allow for water and air penetration, but still prevent light from reaching weeds (Christopher, 2023). Typically, a technique called sheet mulching, or lasagna mulching, is used to supress weeds and to allow growing space for new plants. In this method, a layer or two of biodegradable newspaper or cardboard is covers existing vegetation and is then followed with compost, manure, or other soil amendments, roughly six inches deep. Next, a few more inches of woodchips are placed directly on top of the soil amendment. Spaces are made in the woodchip mulch to allow new plants access to the soil amendment. Using woodchips not only suppresses weed activity but also retains soil moisture and helps prevent erosion. Overtime, the woodchips decompose naturally and become part of the soil structure.

Depending on the budget and the scale of the project, hardscaping and pathways may need to be installed as part of the site’s accessibility. Hardscaping may be used to level slopes and reduce runoff potential, or for visual interest and elevation as part of the design. Pathways are necessary for maintenance and to guide visitors through the garden experience depending on the size (and budget) of the project. Mowed grass, woodchips, stones, or bricks may be considered for pathways but each comes with its own challenges and associated costs. If the pathways are

simply for maintenance, woodchips will suffice. If public wheelchair access is required, a more permanent and sturdy option should be used.

Plants may be installed in the early spring once the soil is workable or in the early fall after the extreme heats of summer have subsided. The objective is to allow enough time for the root systems to establish in order to survive a harsh winter or any drought periods. Irrigation and weeding maintenance routines should occur weekly to biweekly depending on weather conditions. Supplemental watering will be necessary for the first two to five years until plants have thoroughly established themselves. Seeding will require longer maintenance but will cost significantly less. Soaker hose may be installed beneath the woodchips and on top of the soil amendment for direct contact with plant roots. This will make water application more efficient and cost effective, though may not be realistic in larger garden environments. Invasive weeds will grow remarkably faster than the perennial seedlings of the prairies. They will need to be hand-weeded consistently to allow for proper establishment of the desired species. Mowing weeds back once they are greater than 6" may be an option to allow for light penetration though may not be feasible with the stability of wood mulch in the first season; a weedwhacker may be easier to operate. If possible, volunteers in the community can be sourced to help maintain the gardens. This kind of public approach is more appropriate in community garden situations rather than personal homeowner beds and local nature-enthusiasts should always be appreciated for their maintenance endeavours. It is also advisable to seek expert advice throughout the entire process. Local nursery experts or Indigenous Knowledge Keepers may assist in plant selection, utilization, and can lead to a successful restoration project.

Best practices in assessing success?

In order to properly assess the success of a prairie restoration, many factors must be considered to establish clear objectives. The scale of the project, the methods used, the timeline, and the budget will all shape and determine what will be considered a successful restoration. Ideally, in all sizes of projects, a sustained increase in biodiversity (species diversity and abundance) from start to finish will be the main objective (Török, 2011). This can be measured periodically and improvements or corrections can be implemented at each stage to keep a project on the correct course. Ecosystem services and function may also be considered. Optimally, once native species have been planted, pollinators and other wildlife will use the vegetation as shelter, food sources, and nesting areas. This can be assessed through measuring the prevalence of predetermined local indicator species based on the objectives of the restoration. A baseline assessment should be performed at the beginning of the assessment to compare the various stages of progression. Long-term monitoring and invasive species control will truly gauge the success of a restoration project but may not always be feasible or may be beyond the scope of a project.

Depending on the objectives of the restoration, soil quality assessments may be performed over longer periods of time, especially if phytoremediation is a desired component. Hydrological assessments may also be observed, especially during intense weather events or near riparian areas. In all sizes of projects, the flora and fauna abundance will be critical in determining the success rate of a project. Typically, pre-settlement conditions observed in remnant prairie ecosystems are used as the comparable baseline for most projects to aspire toward. Realistically, given the everchanging climate change complications in the environment, restoration goals for success should instead focus on resiliency and ecosystem functionality as opposed to aiming for getting things back to the way they were prior to colonization. (Thorpe, 2011).

Community outreach and engagement may also be a factor of success for a project. If community members become passionate about the restoration garden and provide continual support and maintenance, while replicating similar restorations in their own landscapes, certainly this would attribute to the success of a project. This qualitative component may be difficult to assess, but the ecological, economical, and social components of a project must all be evaluated and ranked in terms of their importance for success.

Challenges of small-scale restorations?

Challenges arise at all scales of restoration projects, from small home landscapes and urban community gardens to rural gardens and acres of natural habitat restoration. Addressing habitat fragmentation and genetic diversity are key components to restoration projects and may not always be easily accomplished in urban environments. The potential for urban grassland ecosystems to provide biodiversity-friendly solutions is definitely within reach but more research into long-term dynamics and management needs to be further developed to achieve this (Klaus, 2013). By creating small-scale patchwork mosaics and matrices, “stepping stone” habitats may be provided for more mobile pollinator species and some seed producing flora. Landscape connectivity as a whole is a challenge, especially when dealing with land availability and ownership. Ideal restoration locations are not always possible, that is why the importance of small-scale lawn conversion is so critical. The very design of urban ecosystems and its impact on biodiversity comes into question. Utilizing these urban green spaces can yield important insights into the management of resorted and natural ecosystems, habitat fragmentation, and habitat quality (Savard, 2000; Angold, 2006).

Every restoration project, regardless of size, deals with the challenges and complications of acquiring adequate funding and resources. One of the benefits of small-scale operations is that the price tag is more feasible than a larger scale project and can be more easily added to and managed on a personal level. Given the limited availability of funding for biodiversity restoration endeavours from government and NGO sources, restoration projects may hit roadblocks before they even begin. Another issue of acquisitioning funding for long-term

management and maintenance is that the process of restoration is still relatively new. It is unclear how long of a scope is necessary to maintain a restored ecosystem before it is balanced or self-sufficient (McLachlan, 2005). Prairies have formed through thousands of years of adaptation and evolution; they are not so easily restored.

The added difficulties of adjacent properties in urban environments also provide potentially unforeseen complications. High traffic areas or industrial areas may not prove conducive to a prairie landscape given their external stresses, but smaller scale gardens in residential areas definitely prove more suitable and hospitable. In this regard, large-scale restorations may not be possible within city limits given the demands of urban land use; again, this speaks to the practical benefits of smaller scale projects (Mutch, 2007).

What species would be appropriate and why?

Certain ecological and aesthetic features and qualities of plant species should be considered when preparing a site design for an urban garden. Factors such as suitability to a site's growing conditions in order to increase chances of success (i.e. soil, moisture, and light preferences), as well as any other environmental features that may influence plant growth must be taken into consideration. Primarily, it depends on the goals of the project (or landowner). If beautification of a property is favoured over the ecological benefits, the visual characteristics of the plants should take priority. This may include the texture or shape of the leaves, the colour and showiness of the flowers, winter interest of the bark and stems, and the height and size a plant is capable of growing. How aggressively a species spreads must also be considered as a single species of a plant can quickly get out of hand or dominate a landscape. If a location has a high invasive weed population or has challenging growing conditions, like a brown field, something that spreads more aggressively would be more suited to these circumstances. Fortunately, both ecological and aesthetic requirements can be satisfied and still provide a biodiversity-friendly garden that enhances habitat connectivity as well as aesthetic improvement and recreation (Klaus & Kiehl, 2021). One of the main components that should be considered in plant selection is the blooming period of the desired wildflower (or other plant type). Ideally, a design should plan to have constant flowers in bloom during the entire growing season. This will ensure ever-present visual appeal and also a constant food source for pollinators. The following plant species have been selected as suitable examples for a prairie garden based on their blooming periods, their different structures, and also their ecological services.

Common name	Scientific name	Light	Moisture	Height	Colour	Blooming Perioid
Wildflowers						
Prairie Crocus	*Pulsatilla patens*	Full Sun	Dry - Medium	15 - 20 cm	Mauve	April - May
Heartleaf Alexander	*Zizia aptera*	Full Sun	Medium to Moist	30 - 60 cm	Yellow	June
Purple Prairie Clover	*Dalea purpurea*	Full Sun	Dry - Moist	20 - 50 cm	Purple	July
Smooth Aster	*Aster laevis*	Full Sun - Part Shade	Dry - Moist	60 - 120 cm	Mauve	August - September
Stiff Goldenrod	*Solidago rigida*	Full Sun	Dry - Moist	40 - 75 cm	Yellow	August - September
Grasses						
Big bluestem	*Andropogon gerardi*	Full Sun - Part Shade	Medium - Wet	100 - 175 cm	Green	Warm Season
June Grass	*Koeleria macrantha*	Full Sun	Dry - Medium	15 - 40 cm	Green	Cool Season
Shrubs						
Saskatoon	*Amelanchier alnifolia*	Full Sun	Dry - Medium	2 - 4 m	White	May
Red-osier Dogwood	*Cornus stolonifera*	Full Sun - Shade	Medium - Wet	1 - 3 m	White	June
Trees						
Bur Oak	*Quercus macrocarpa*	Full Sun - Part Shade	Dry - Medium	10 - 25 m	Green	Spring
Showy Mountain Ash	*Sorbus decora*	Full Sun - Part Shade	Dry - Medium	4 - 6 m	White	Spring

(Prairie Originals, n.d.; Naturescape Manitoba, 2007).

These species provide a variety of wildlife food sources such as nectar and pollen, fruits and seeds, as well as browse value in their vegetative matter. The wildflowers present here will provide blooms throughout the entire growing season and the grasses provide structural support to the forbs as well as visual interest with their colour and form. The shrubs selected are good food sources to wildlife and provide winter interest with their unique bark. Although the bur oak is one of the slowest growing deciduous trees, it provides habitat and resources to over 700 species, making it one of the most ecologically valuable species in North America (Tallamy, 2019). There is a plethora of annual and perennial native species to choose from for natural, wholistic garden designs and the only real limiting factors are space, money, and time.

Conclusion

Ecological restoration can be easily applied and utilized in urban environments with a little enthusiasm and education into ecological principles. Traditional colonial-based turf grass lawns

do not have to be the standard. Boulevards, yards, and greenspaces can methodically be replaced with thriving, exuberant native species that play host to a variety of beneficial pollinator species. Landscape architects, designers, ecologists, and city officials can all achieve their common goals while beautifying urban environments and combating climate change (Kiers et al., 2022). Through community outreach, governmental policy amendments, and Indigenous Knowledge sharing, landscapes can be conserved, revitalized, and restored (Clarkson & Kirby, 2016).

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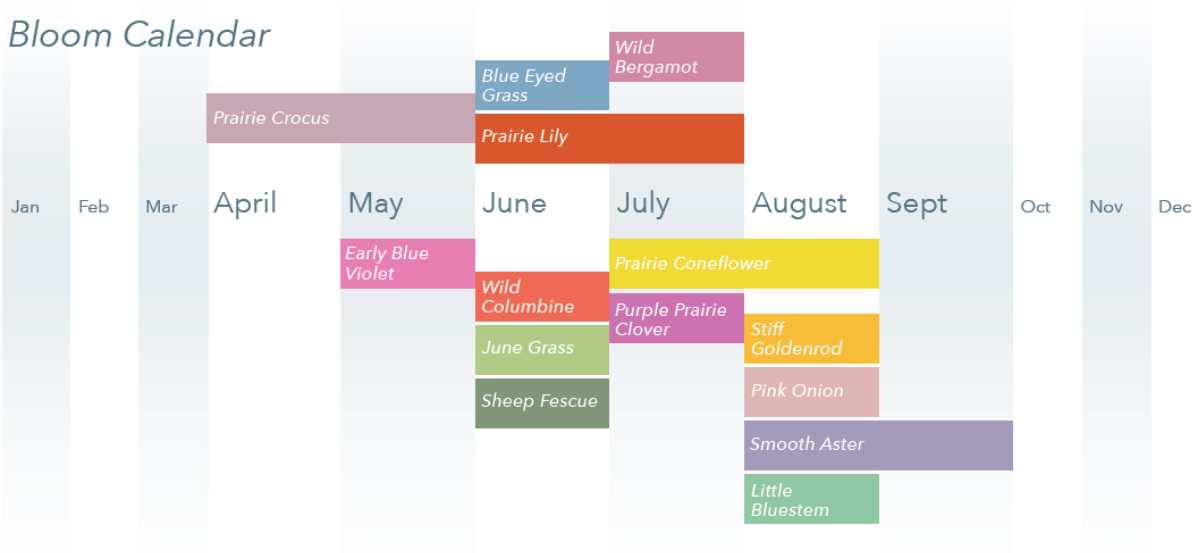
Bloom Calendar & Garden Design

Prairie Wildflower Garden Design

Ben Horne | ben.a.horne@gmail.com | 2023

Bloom Calendar



Winter Tasks: Planning

December to March

- Plan for new beds, plants, and resource acquisition.
- Indoor seed germination (scarification & stratification).
- If purchasing, pre-order new seeds and plants in advance.
- Collect cardboard for new beds.

Spring Tasks: Preparation

April to June (after snow melt)

- Remove and compost plant debris.
- Install irrigation systems when ground is workable.
- Obtain and apply mulch and soil amendments.
- Divide plants.
- Sow spring seeds.

Summer Tasks: Maintenance

July to early September

- Water and weeding.
- Apply and manage compost.
- Photograph flowers.
- Enjoy and document animal interactions.
- Stop and smell the flowers.
- Watch the pollinators!

Fall Tasks: Harvest

September to November

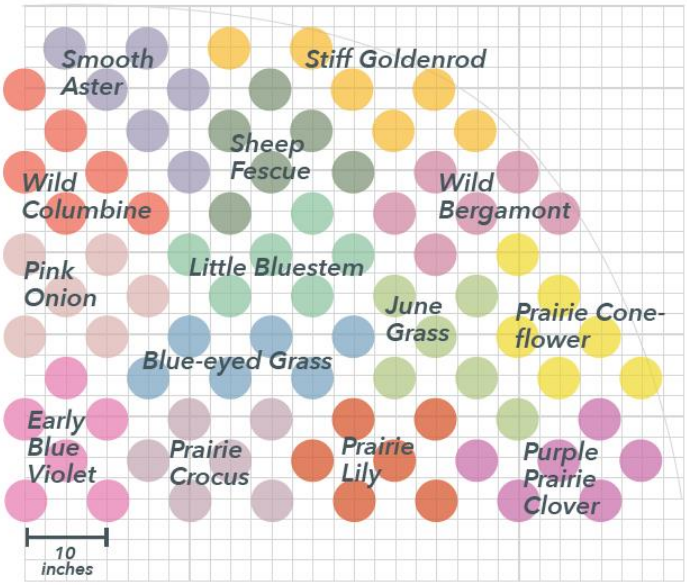
- Harvest and inventory seeds.
- Equipment maintenance and storage.
- Sow fall seeds.

Garden Map

The main purpose of this project is to address native habitat degradation and biodiversity loss within urban environments. The project aims to create an example of a prairie wildflower garden that highlights native plant and pollinator species and remains aesthetically pleasing within a site design and curated landscape. The intention is to firstly, repurpose a small-scale lawn into a biodiverse wildflower garden and secondly, to educate and inspire observers to create their own local wildflower patches, therefore helping to create a matrix of native habitats throughout an urban environment.

The native species in the garden design have been selected based on their drought-tolerance, hardiness, form, texture, colour, and blooming period. This garden design is intended for a full to part sun location in the front yard of a residence. The objective is to create a low maintenance prairie wildflower garden that provides constant blooms throughout the entire growing season, to be enjoyed by pollinators and the homeowner.

For more information, contact Ben Horne (ben.a.horne@gmail.com).




Early Blue Violet


Prairie Coneflower


Prairie Crocus


Smooth Aster


Stiff Goldenrod


Wild Bergamont


Prairie Lily

APPENDIX III - Activity List

WBS #	Deliverable	Activity	Duration Estimate	Activity Initiated	Completion Date	Activity Duration
1.1	Wildflower Garden Layout	Site inspection	1 week			
1.1.a		Measure dimensions	1 day			
1.1.b		Record topographic details	1 day			
1.1.c		Perform soil test	1 month			
1.1.d		Locate water source	1 week			
1.2	Site map	Map out site attributes	1 week			
1.3	Plant list	Research plants	1 month			
1.3.a		Determine plants	1 month			
1.3.b	Species reference guide	Research compilation	1 month			
1.4	Design drafts	Draft designs	1 month			
1.5	Maintenance schedule	Organize maintenance schedule tasks	1 week			
1.6		Meet with partners for updates	On going			
1.7		Funding applications	5 months			
2.1	Wildflower Garden	Site preparation	1 month			

2.1.a		Organize volunteers	2 months			
2.1.b		Remove existing vegetation	1 month			
2.1.c		Stake out dimensions and locations	1 week			
2.1.d		Incorporate soil amendments	1 week			
2.1.e		Photo documentation of process	On going			
2.2	Plant and Signage Installation		1 month			
2.2.a		Acquire plants and signs	1 month			
2.2.b		Plant accordingly	1 week			
2.2.c		Water plants	On going			
2.2.d		Install signage	1 day			
2.2.e		Install pathways	1 week			
2.3		Site maintenance	On going			
2.3.a		Upkeep duties	On going			
2.3.b		Connect with MB Master Gardeners	1 month			
2.4		Assessment	On going			
2.4.a		Observe and document garden condition	On going			
2.4.b		Record and make adjustments	On going			

3.1	Educational Signage	Research	1 month			
3.1.a		Plant, pollinator, environmental information	1 month			
3.2		Create illustrations and images	On going			
3.2.a		Draw and photograph	1 week			
3.2.b		Consult with graphic designer	1 month			
3.3		Edit signage content	1 month			
3.3.a		Test content with target audiences	On going			
3.4		Printing and framing	1 month			
4.1		Community engagement	On going			
4.1.a		Organize volunteers and networking	2 months			
4.2		Develop online presence	On going			
4.2.a		Create social media accounts	1 day			
4.2.b		Network with followers for outreach	On going			
4.3		Organize events	2 months			
4.3.a		Plan site prep dates	1 day			

4.3.b		Contact specialists as presenters	On going			
4.3.c		Contact teaching opportunities	On going			
4.4		Attend WWP and sponsor meetings	On going			
4.4.a		Increase community involvement	On going			

APPENDIX IV - RACI Chart

	WWP	**BBG**	**Graphic Designer**	**Volunteers**	**Advisor**	**Ben Horne**
Location acquisition	A	R	N/A	N/A	C	R
Plant selection and purchase	A	N/A	N/A	I	C	R
Garden design layout	C	I	R	N/A	A	R
Educational Signage	C	C	R	I	C	R
Volunteer organization	R	I	N/A	R	I	R
Garden Installation	R	C	N/A	R	C	R
Garden Upkeep	C	I	N/A	R	I	R
Garden Assessment	A	C	I	I	A	R

R = Responsible, A = Accountable, C = Consult, I = Inform.

APPENDIX V - Material, Supplies, & Equipment List

- **Basic garden implements** (shovels, rototillers, tarps, wheelbarrows, etc.).

- **Water**. Provided by the landowner. Supplemental rainwater cannot be depended on.
- **Plants.** Acquired from Prairie Originals in Selkirk, MB. Alternative seed sources may be sourced from wild locations if time permits. This will include forbs, grasses, shrubs, and trees.
- **Graphic designer** hourly rate. May not be necessary for simple identification signs.
- The **signs** will have to be printed, manufactured for weather resistance. The number of signs will also be dependent on how large the space is and the number of species needing to be labeled. Value added material may fall under this category.
- **Mulch**. Woodchips from the City of Brandon Waste Management Facility are available to the public for free. Flax or straw bales may also be considered. Leaf mulch may work for consecutive years outside the scope of the project.
- **Pathway materials.** This could be bricks or stones or paving, and all dependent on budget. Pathways may simply be mowed grass spaces or mulch. Hard landscaping materials could be an option but unlikely given the size and budget of the project.
- **Value Added** Bat house, bird houses, bee hotel materials. Could be scraps of wood, could be newly purchased, dependent on availability. Tools and materials required for assembly and installation. Unlikely to be used in final design, but potential for expansion should be considered.
- **Compost/Soil Amendments.** May be procured from the City of Brandon Waste Management Facility. Free amendments will likely contain weed seeds, but the mulch will help suppress those problems. Purchasing individual bags may be necessary if free materials cannot be acquired. Buying in bulk would prove most cost effective.
- **Storage for equipment.** A shed is available for temporary storage during the timeframe of the project. This may hold equipment and planting materials.
- **Refreshments** for the volunteers. This is dependent on the amount of events needed to install and maintain the garden. Could likely budget $100-$200 for each event, depending on total number of participants. Perhaps a company would be interested in catering/donating for the event. Research required for potential partnership.

APPENDIX VI - Probability & Impact Matrix of Project Risks

Probability and Impact Matrix				Risk Level:
Project name:	Wildflower Garden	Project number:	1	**high = .75**
Project Manager name:	Ben Horne	Date:	04/05/23	**med = .5**
Project Sponsor name:	Sharon Enns			**low = .25**

Risk #	**Risk**	**Probability**	**Impact**	**Risk Score (Probability x Impact)**
1	**Budget / Funding**			**0.47**
1.1	Insufficient funds	0.75	0.75	0.56
1.2	Increased costs	0.5	0.75	0.38
2	**Weather Events**			**0.20**
2.1	Flood/heavy rain	0.5	0.5	0.25
2.2	Drought	0.5	0.5	0.25
2.3	High Winds	0.5	0.25	0.13
2.4	Fire	0.25	0.75	0.19
2.6	Frost	0.5	0.5	0.25
2.7	Snow	0.5	0.25	0.13
3	**Project Schedule**			**0.06**
3.1	Over-time	0.25	0.25	0.06
4	**Quality**			**0.09**
4.1	Poor public image	0.25	0.25	0.06
4.2	Poor project quality	0.25	0.5	0.13
5	**Key Stakeholder Consensus**			**0.14**
5.1	Board disapproval	0.25	0.75	0.19

5.2	Community/Public disapproval	0.25	0.5	0.13
5.3	Partner disapproval	0.25	0.5	0.13
5.4	Indigenous disapproval	0.25	0.5	0.13
6	**Scope Changes**			**0.13**
6.1	Location backs out	0.25	0.75	0.19
6.2	Partner backs out	0.25	0.25	0.06
7	**Personnel Issues**			**0.22**
7.1	Personal burnout	0.25	0.75	0.19
7.2	Volunteer burnout	0.5	0.5	0.25
8	**Plant Issues**			**0.13**
8.1	No plants from supplier	0.25	0.75	0.19
8.2	Plants do not grow	0.25	0.75	0.19
8.3	Theft	0.25	0.25	0.06
8.4	Vandalism	0.25	0.25	0.06
8.5	Poor soil conditions	0.5	0.25	0.13
9	**Pests / Disease**			**0.32**
9.1	Insects	0.5	0.5	0.25
9.2	Geese	0.75	0.25	0.19
9.3	Deer	0.75	0.5	0.38
9.4	Rabbits	0.75	0.5	0.38
9.5	Weeds	0.75	0.75	0.56
9.6	Disease	0.25	0.75	0.19
10	**Vendor Delays**			**0.09**
10.1	Plants	0.25	0.5	0.13
10.2	Soil amendments	0.25	0.25	0.06
10.3	Mulch	0.25	0.25	0.06

10.4	Water	0.25	0.5	0.13
11	**Political Issues**			**0.23**
11.1	MB Hydro backs out	0.5	0.75	0.38
11.2	City of Wpg backs out	0.25	0.75	0.19
11.3	Prov of MB backs out	0.25	0.75	0.19
11.4	Federal backs out	0.25	0.75	0.19
12	**Project Management**			**0.21**
12.1	Lack of skills	0.5	0.5	0.25
12.2	Inexperience	0.5	0.5	0.25
12.3	Poor planning	0.25	0.5	0.13

APPENDIX VII - Risk Register

Risk Register

				Risk Level:
Project name:	Wildflower Garden	Project number:	1	**High**
Project Manager name:	Ben Horne	Date:	05-04-2023	**Med**
Project Sponsor name:	Sharon Enns			**Low**

Risk #	Risk Name	Response Plan Created	Response Plan Location	Risk Owner	Status
1	Budget / Funding	Yes	Risk Assessment and Risk Management Plan	Ben Horne	Active

9	Pests / Disease	Yes	Risk Assessment and Risk Management Plan	Ben Horne	Active
2	Weather Events	Yes	Risk Assessment and Risk Management Plan	Ben Horne	Active
7	Personnel Issues	Yes	Risk Assessment and Risk Management Plan	Ben Horne	Active
11	Political Issues	Yes	Risk Assessment and Risk Management Plan	Ben Horne	Active
12	Project Management	Not yet	TBD	Ben Horne	Active
3	Project Schedule	Not yet	TBD	Ben Horne	Active
4	Quality	Not yet	TBD	Ben Horne	Active
5	Key Stakeholder Consensus	Not yet	TBD	Ben Horne	Active
6	Scope Changes	Not yet	TBD	Ben Horne	Active
8	Plant Issues	Not yet	TBD	Ben Horne	Active
10	Vendor Delays	Not yet	TBD	Ben Horne	Active

APPENDIX VIII - Interested Parties Register

Interested Party	**Why they Care**	**What they Seek from Us**	**What we Seek from Them**	**Implications to Relationship Management**

Confirmed:

Nicola Koper	Academic Advisor	Academic integrity	Advise, connections, guidance	High level, obligation
Winnipeg Wildflower Project	Likeminded Values	Organization, Project Management	Resources, guidance, networking	Could lead to future projects
Sharon Enns	Landowner, Likeminded Values	Garden Project Implementation	Opportunity for prairie restoration	High level, obligation
Andrea McDougald	Likeminded	Money	Graphic Design Skills	Supporting Local

Potential:

Indigenous groups: U of M Elders in residence (Norman Meade? Audrey Logan?) MMF Assembly of MB Chiefs Southern Chiefs Organization Marla Robson	Historical and cultural significance, representation	TBD, acknowledgement, representation	Knowledge, participation	Improved cultural relations, inclusivity, traditional knowledge

Local/Community Organizations:	Likeminded Values	TBD, Collaboration	Resources, support, knowledge, volunteers, funding, word of mouth	Continued local support, maintenance potential, future work opportunities, networking
Sierra club prairie chapter				
Save our Seine				
Point Douglas Community Gardens				
Pollinate Wpg				
Harte Trail				
Living Prairie Museum				
Sustainable Organic Solutions				
The Prairie Garden				
St. Vital Agricultural Society				
The Grow Guide Podcast				
University of Manitoba				
St. Vital Park				
Conservation and Climate (MB Gov)				
Specialists:	Likeminded Values, Experience	TBD	Expertise, Knowledge, support, funding, skills	Strong publicity, wide support base
Yard reform				
Sustainable Sprout				

Sarah Price
Landscapes

Sustainable Roots

Nina-Marie Lister

Common ground YXE

The Wildflower
Project MN

Groundskeeper
Dannie (WPG
Cemetery
Groundskeeper)

Benjamin Vogt

Piet Oudolf

Tony Spencer (The New Perennialist)

Prairie Moon Nursery
MN

Monty Don

U of M Landscape
Architecture

Native Plant Solutions

NGOs:	Likeminded Values, Experience	TBD, Environmental restoration	Expertise, Knowledge, support, funding, skills	Strong publicity, wide support base, significant funding opportunities
Canadian Wildlife Federation				
Canadian Conservation Corps				
UN biodiversity				
Xerces Society				

Escarpment Conservancy				
Our Safety Net				
Greta Thunberg				
David Suzuki Foundation				
MN Native Landscapes Inc				
MHHC				
NCC				
DU				
Social Media Groups	Likeminded Values	Content	Publicity, Financial Support, Referral	Continued coverage and sponsorship, networking
Prairie Lane Art Design				
Ecological Design Lab				
Bees Native Plants				
Broken Forest (Lynsey Sable)				
Roots and Shoots				
Nature Manitoba				
Garden Manitoba				
Green Matters				
Prairie Garden Seeds				
Gardensmb				
Manitoba Wildflowers				